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Fourth Canadian Edition

Developmental Psychology

Childhood and Adolescence

David R. Shaffer
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Developmental Psychology: Childhood and Adolescence, Fourth Canadian Edition
by David R. Shaffer, Katherine Kipp, Eileen Wood, and Teena Willoughby

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1

Introduction to Developmental Psychology and Its Research Strategies

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Let's begin this book with a question: Why did you choose to enroll in a course on human development? For many of you majoring in psychology, family studies, elementary education, or nursing, this class is required and there is no way around it. Expectant parents may take the course in order to learn more about their babies. Occasionally, people choose the course seeking to answer specific questions about their own behaviour or that of a friend or family member. Whatever your reasons, at one time or another you have probably been curious about one or more aspects of human development. For example,

- What does the world look like to newborn infants? Can they make any sense of their new surroundings?
- When do infants first recognize their mothers? their fathers? themselves (in a mirror)?
- Why do many 1-year-olds seem so attached to their mothers and wary of strangers?
- Foreign languages are difficult to follow if we merely listen to people conversing in them. Yet infants and toddlers pay close attention to conversations and will acquire their native language without any formal instruction. How is this possible? Is language learning easier for children than for adults? Is a child in a bilingual home at a disadvantage?
- Why do young children say that objects like the sun and clouds are alive?
- Why do you remember so little about the first two or three years of your life?
- Why are some people friendly and outgoing, while others are shy and reserved? Does the home environment influence an individual's personality? If so, why are children from the same family often so different from one another?
- What are the impacts on children of losing a parent (due to death or divorce) or gaining a stepparent?
- What roles do close friends play in a child's or an adolescent's development?
- Why is it that all humans turn out similar in many ways and, at the same time, so different from one another?

Introduction to Developmental Psychology

Research Strategies: Basic Methods and Designs

Cultural Influences: A Cross-Cultural Comparison of Gender Roles

Research Strategies and Studying Development

Postscript: On Becoming a Wise Consumer of Developmental Research

Summary

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Introduction to Developmental Psychology

The aim of this book is to seek answers for these and many other fascinating questions about developing persons by reviewing the theories, methods, discoveries, and many practical accomplishments of the modern developmental sciences. This introductory chapter lays the groundwork for the remainder of the book by addressing important issues about the nature of human development and how knowledge about development is gained. What does it mean to say that people "develop" over time? How is your experience of development different from that of developing persons in past eras or in other cultures? Why are scientific studies of human development necessary? And what strategies, or research methods, do scientists use to study the development of children and adolescents? Let's begin by considering the nature of development.

What Is Development?

development
systematic continuities and changes in the individual over the course of life.

developmental continuities
ways in which we remain stable over time or continue to ref ect our past.

developmental psychology
branch of psychology devoted to identifying and explaining the continuities and changes that individuals display over time.

developmentalist
any scholar, regardless of discipline (for example, psychologist, biologist, sociologist, anthropologist, educator), who seeks to understand the developmental process.

maturation
developmental changes in the body or behaviour that result from the aging process rather than from learning, injury, illness, or some other life experience.

learning
relatively permanent change in behaviour (or behavioural potential) that results from one's experiences or practice.

Development refers to systematic continuities and changes in the individual that occur between conception (when the father's sperm penetrates the mother's ovum, creating a new organism) and death. By describing *changes* as "systematic," we imply that they are orderly, patterned, and relatively enduring, so temporary mood swings and other transitory changes in our appearances, thoughts, and behaviours are therefore excluded. We are also interested in **continuities** in development, or ways in which we remain the same or continue to reflect our past.

If development represents the continuities and changes an individual experiences from "womb to tomb," *developmental sciences* refers to the study of these phenomena and is a multidisciplinary enterprise. Although **developmental psychology** is the largest of these disciplines, many biologists, sociologists, anthropologists, educators, physicians, and even historians share an interest in developmental continuity and change, and have contributed in important ways to our understanding of both human and animal development. Because the science of development is multidisciplinary, we use the term **developmentalist** to refer to any scholar—regardless of discipline—who seeks to understand the developmental process.

What Causes Us to Develop?

To grasp the meaning of development, we must understand two important processes that underlie developmental change: maturation and learning. **Maturation** refers to the biological unfolding of the individual according to species-typical biological inheritance and an individual person's biological inheritance. Just as seeds become mature plants, assuming that they receive adequate moisture and nourishment, human beings grow within the womb. The human maturational (or species-typical) biological program calls for us to become capable of walking and uttering our first meaningful words at about 1 year of age, to reach sexual maturity between ages 11 and 15, and then to age and die on roughly similar schedule. Maturation is partly responsible for psychological changes such as our increasing ability to concentrate, solve problems, and understand another person's thoughts or feelings. So one reason that we humans are so similar in many important respects is that our common species heredity guides all of us through many of the same developmental changes at about the same points in our lives.

The second critical developmental process is **learning**—the process through which our *experiences* produce relatively permanent changes in our feelings, thoughts, and behaviours. Let's consider a very simple example. Although a certain degree of physical maturation is necessary before an elementary school child can become reasonably proficient at dribbling a basketball, careful instruction and many, many hours of practice are essential if this child is ever to approximate the ball-handling skills of a professional basketball player. Many of our abilities and habits do not simply unfold as part of maturation; we often learn to feel, think, and behave in new ways from our observations of and interactions with parents, teachers, and other important people in our lives, as well as

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The Canadian Press (Frank Gunn)

Despite the common assumption that superstars are natural athletes, the special skills they display require an enormous amount of practice. Mike Weir worked hard to become such an accomplished golfer.

normative development
developmental changes that characterize most or all members of a species; typical patterns of development.

ideographic development
individual variations in the rate, extent, or direction of development.

from events that we experience. This means that we change in response to our *environments*—particularly in response to the actions and reactions of the people around us. Of course, most developmental changes are the product of *both* maturation and learning. And as we will see throughout this book, some of the more lively debates about human development are arguments about which of these processes contribute most to particular developmental changes.

What Goals Do Developmentalists Pursue?

Three major goals of the developmental sciences are to describe, to explain, and to optimize development (Baltes, Reese, & Lipsitt, 1980). In pursuing the goal of *description*, human developmentalists carefully observe the behaviour of people of different ages, seeking to specify how people change over time. Although there are typical pathways of development that virtually all people follow, no two persons are exactly alike. Even when raised in the same home, children often display very different interests, values, abilities, and behaviours. Thus, to adequately describe development, it is necessary to focus both on typical patterns of change (or **normative development**) and on individual variations in patterns of change (or **ideographic development**). So developmentalists seek to understand the important ways that developing humans resemble each other and how they are likely to differ as they proceed through life.

Adequate description provides us with the "facts" about development, but it is only the starting point. Developmentalists next seek to *explain* the changes they have observed. In pursuing this goal of explanation, developmentalists hope to determine *why* people develop as they typically do and *why* some people develop differently than others. Explanation centres both on normative changes *within* individuals and on variations in development *between* individuals. As we will see throughout the text, it is often easier to describe development than to conclusively explain how it occurs.

Finally, developmentalists hope to *optimize* development by applying what they have learned in attempts to help people develop in positive directions. This is a practical side to the study of human development that has led to such breakthroughs as ways to:

- Promote strong affectional ties between fussy, unresponsive infants and their frustrated parents;
- Assist children with learning difficulties to succeed at school; and
- Help socially unskilled children and adolescents prevent the emotional difficulties that could result from having no close friends and being rejected by peers.

Many believe that such *optimization* goals will increasingly influence research agendas in the 21st century (Fabes, Martin, Hanish, & Updegraff, 2000; Lerner, Fisher, & Weinberg, 2000) as developmentalists show greater interest in solving real problems and communicating the practical implications of their findings to the public and policymakers (APA Presidential Task Force on Evidence-Based Practice, 2006; Kratochwill, 2007; McCall & Groark, 2000; Schoenwald et al., 2008). Yet this heavier focus on *applied* issues in no way implies that traditional descriptive and explanatory goals are any less important, because optimization goals often cannot be achieved until researchers have adequately described normal and idiopathic pathways of development and their causes (Schwebel, Plumert, & Pick, 2000).

Some Basic Observations about the Character of Development

Now that we have defined *development* and talked very briefly about the goals that developmentalists pursue, let's consider some of the conclusions they have drawn about the character of development.

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A Continual and Cumulative Process. Although no one can specify precisely what adulthood holds in store from even the most meticulous examination of a person's childhood, developmentalists have learned that the first 12 years are extremely important for setting the stage for adolescence and adulthood. Who we are as adolescents and adults also depends on the experiences we have later in life. Obviously, you are not the same person you were at age 10 or even at age 15. You have probably grown somewhat, acquired new academic skills, and developed very different interests and aspirations from those you had as a fifth-grader or a high school junior. And the path of such developmental change stretches ever onward, through middle age and beyond, culminating in the final change that occurs when we die. In sum, human development is best described as a *continual* and *cumulative* process. The one constant is change, and the changes that occur at each major phase of life can have important implications for the future.

Table 1.1 presents a chronological overview of the life span as developmentalists see it. Our focus in this text is on development during the first five periods of life—prenatal development, infancy and toddlerhood, preschool, middle childhood, and adolescence. By examining how children develop from the moment they are conceived until they reach young adulthood, we will learn about ourselves and the determinants of our behaviour. Our survey will also provide some insight as to why no two individuals are ever exactly alike. Our survey won't provide answers to every important question you may have about developing children and adolescents. The study of human development is still a relatively young discipline with many unresolved issues. But as we proceed, it should become quite clear that developmentalists have provided an enormous amount of very practical information about young people that can help us to become better educators, child/adolescent practitioners, and parents.

A Holistic Process. It was once fashionable to divide developmentalists into three camps: (1) those who studied *physical growth* and development, including bodily changes and the sequencing of motor skills; (2) those who studied *cognitive* aspects of development, including perception, language, learning, and thinking; and (3) those who concentrated on *psychosocial* aspects of development, including emotions, personality, and the growth of interpersonal relationships. Today we know that this classification is misleading, for researchers who work in any of these areas have found that changes in one aspect of development have important implications for other aspects. Let's consider an example.

TABLE 1.1 A Chronological Overview of Human Development

Period of Life	Approximate Age Range
1. Prenatal period	Conception to birth
2. Infancy	Birth to 18 months old
3. Toddler period	18 months to 3 years
4. Preschool period	3 to 5 years of age
5. Middle childhood	5 to 12 or so years of age (until the onset of puberty)
6. Adolescence	12 or so to 20 years of age (many developmentalists define the end of adolescence as the point at which the individual begins to work and is reasonably independent of parental sanctions)
7. Young adulthood	20 to 40 years of age
8. Middle age	40 to 65 years of age
9. Old age	65 years of age or older

Note: The age ranges listed here are approximate and may not apply to any particular individual. For example, a few 10-year-olds have experienced puberty and are properly classified as adolescents. Some adolescents are fully self-supporting, with children of their own, and are best classified as young adults.

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What determines a person's popularity with peers? If you were to say that social skills are important, you would be right. Social skills such as warmth, friendliness, and willingness to cooperate are characteristics that popular children typically display. Yet there is much more to popularity than meets the eye. We now have some indication that the age at which a child reaches puberty, an important milestone in physical development, has an effect on social life. For example, boys who reach puberty early enjoy better relations with their peers than do boys who reach puberty later (Livson & Peskin, 1980). Children who do well in school also tend to be more popular with their peers than children who perform somewhat less well in school.

We see, then, that popularity depends not only on the growth of social skills but also on various aspects of both cognitive and physical development. As this example illustrates, development is not piecemeal but **holistic**—humans are physical, cognitive, and social beings, and each of these components of self depends, in part, on changes taking place in other areas of development. Many researchers now incorporate this holistic theme into their theories and research. For example, in reviewing the literature on sex differences in science and mathematics, Halpern and her colleagues (Halpern et al., 2007) adopted a biopsychosocial approach in which they considered all aspects of the child in understanding sex differences and similarities. The holistic perspective is one of the dominant themes of human development today and a perspective around which this book is organized.

holistic perspective
unif ed view of the developmental process that emphasizes the important interrelationships among the physical, mental, social, and emotional aspects of human development.

Plasticity. **Plasticity** refers to a capacity for change in response to positive or negative life experiences. Although we have described development as a continual and cumulative process and noted that past events often have implications for the future, developmentalists know that the course of development can change abruptly if important aspects of a person's life change. For example, somber babies living in barren, understaffed orphanages often become quite cheerful and affectionate when placed in socially stimulating adoptive homes (Rutter, 1981). Highly aggressive children who are intensely disliked by their peers often improve their social status after learning and practising the social skills that popular children display (Mize & Ladd, 1990; Shure, 1989). It is indeed fortunate that human development is so plastic, for children who have horrible starts can often be helped to overcome their deficiencies.

plasticity
capacity for change; a developmental state that has the potential to be shaped by experience.

Historical/Cultural Context. No single portrait of development is accurate for all cultures, social classes, or racial and ethnic groups. Each culture, subculture, and social class transmits a particular pattern of beliefs, values, customs, and skills to its younger generations, and the content of this cultural socialization has a strong influence on the attributes and competencies that individuals display. Development is also influenced by societal changes: historical events such as wars, technological breakthroughs such as the development of the Internet, and social causes such as the gay and lesbian movement. Each generation develops in its own way, and each generation changes the world for succeeding generations. So we should not automatically assume that developmental patterns observed in North American or European children (the most heavily studied populations) are optimal, or even that they characterize persons developing in other eras or cultural settings (Laboratory of Comparative Human Cognition, 1983). Only by adopting a historical/cultural perspective can we fully appreciate the richness and diversity of human development.

Human Development in Historical Perspective

Contemporary Western societies can be described as "child-centred": Parents focus much of their lives on their children, spend a great deal of money to care for and educate their children, and excuse children from shouldering the full responsibilities of adulthood until attaining the legal age of 14 to 21 (depending on the society), when they have presumably gained the wisdom and skills to adapt to adult life. Childhood and adolescence were not always regarded as the very special and sensitive periods that we regard them as today. To understand how developmentalists think about and approach the study of children, it

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is necessary to see how the concept of childhood has changed over time. You may be surprised just how recent our modern viewpoint really is. Of course, it was only after people came to view childhood as a very special period that they began to study children and the developmental process.

Childhood in Premodern Times

In the early days of recorded history, children had few if any rights and their lives were not always valued by their elders. Archaeological research, for example, has shown that the ancient Carthaginians often killed children as religious sacrifices and embedded them in the walls of buildings to "strengthen" these structures (Bjorklund & Bjorklund, 1992). Until the fourth century CE, Roman parents were legally entitled to kill their deformed, illegitimate, or otherwise unwanted infants. After this active infanticide was outlawed, unwanted babies were often left to die in the wilderness or were sold as servants or as objects for sexual exploitation upon reaching middle childhood (deMause, 1974). Even "wanted" children were often treated harshly by today's standards. For example, boys in the city-state of Sparta were exposed to a strict regimen designed to train them for the grim task of serving a military state. As infants, they were given cold baths to "toughen" them. At age 7, when children in modern society are entering Grade 2, Spartan boys were taken from their homes and housed in public barracks, where they were often beaten or underfed to instill the discipline they would need to become able warriors (deMause, 1974; Despert, 1965).

Not all early societies treated their children as harshly as the citizens of Carthage, Rome, and Sparta. Yet for several centuries CE, children were viewed as family "possessions" who had no rights (Hart, 1991) and whom parents were free to exploit as they saw fit. In Europe, it wasn't until the 12th century CE that legislation equated infanticide with murder (deMause, 1974)!

Children fared a little better during the medieval era. Medieval children were not coddled or indulged to the extent that today's children are. They were often dressed in miniature versions of adult clothing and were depicted in artwork working alongside adults in the shop or the field, or drinking and carousing with adults at parties. And except for exempting very young children from criminal culpability, medieval law generally made no distinctions between childhood and adult offences (Borstelmann, 1983; Kean, 1937). But childhood was generally recognized as a distinct phase of life, and children were thought to have certain needs above and beyond those of adults (see Borstelmann, 1983; Cunningham, 1996; Kroll, 1977).

© Philadelphia Museum of Art/CORBIS

Although medieval children dressed like their elders and often worked alongside them, it is doubtful that they were considered miniature adults.

Toward Modern-Day Views on Childhood

During the 17th and 18th centuries, attitudes toward children and child rearing began to change. Religious leaders of that era stressed that children were innocent and helpless souls who should be shielded from the wild and reckless behaviour of adults. One method of accomplishing this objective was to send young people to school. Although the primary purpose of schooling was to provide a proper moral and religious education, it was now recognized that teaching important subsidiary skills such as reading and writing would transform the

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In some cultures, passage to adulthood occurs at puberty and adolescents are expected to assume adult responsibilities.

innocents into "servants and workers" who would provide society "with a good labor force" (Aries, 1962, p. 10). Although children were still considered family possessions, parents were now discouraged from abusing their sons and daughters and were urged to treat them with more warmth and affection (Aries, 1962; Despert, 1965).

Formal recognition of adolescence as a distinct phase of life came later, during the early years of the 20th century (Hall, 1904). The spread of industry in Western societies is probably the event most responsible for the "invention" of adolescence. As immigrants poured into industrialized nations and took jobs that had formerly been filled by children and teenagers, young people became economic liabilities rather than assets (Remley, 1988). The increasingly complex technology of industrial operations placed a premium on obtaining an educated labour force. So laws were passed in the late 19th century to restrict child labour and make schooling compulsory (Kett, 1979). Suddenly teens were spending much of their time surrounded by age-mates and separated from adults. As they socialized with friends and developed their own peer cultures, teenagers came to be viewed as a distinct class of individuals who had clearly emerged from the innocence of childhood but who were not yet ready to assume adult responsibilities (Hall, 1904).

After World War II, the adolescent experience broadened as increasing numbers of high school graduates postponed marriages and careers to pursue college and university (and postgraduate) educations. Part of the reason for these changes is the increased life span (due, in part, to medical advances) in our current culture compared to that of earlier eras. Because of this, there is the opportunity to take time for exploration in adolescence. Today, it is not at all unusual for young people to delay their entry into the adult world until their mid- to late 20s (Hartung & Sweeney, 1991; Vobejda, 1991). Society condones this "extended adolescence" by requiring workers to obtain increasingly specialized training to pursue their chosen careers (Elder, Liker, & Cross, 1984).

Early Philosophical Perspectives on Childhood. Why did attitudes toward children change so drastically in the 17th and 18th centuries? It is likely that the thinking of influential social philosophers contributed meaningfully to the "new look" at children and child care. Lively speculation about human nature led these philosophers to carefully consider each of the following issues:

1. Are children inherently good or bad?
2. Are children driven by inborn motives and instincts or, rather, are they products of their environments?
3. Are children actively involved in shaping their characters or are they passive creatures moulded by parents, teachers, and other agents of society?

original sin
idea that children are inherently negative creatures who must be taught to rechannel their self sh interests into socially acceptable outlets.

innate purity
idea that infants are born with an intuitive sense of right and wrong that is often misdirected by the demands and restrictions of society.

tabula rasa
the idea that the mind of an infant is a "blank slate" and that all knowledge, abilities, behaviours, and motives are acquired through experience.

Debates about these philosophical questions produced quite different perspectives on children and child rearing. For example, Thomas Hobbes's (1651/1904) doctrine of **original sin** held that children are inherently selfish egoists who must be restrained by society, whereas Jean Jacques Rousseau's (1762/1955) doctrine of **innate purity** maintained that children are born with an intuitive sense of right and wrong that society often corrupts. These two viewpoints clearly differ in their implications for child rearing. Proponents of original sin argued that parents must actively control their egoistic children; the innate purists argued that parents should give their children freedom to follow their inherently positive inclinations.

Another influential view on children and child rearing was suggested by John Locke (1690/1913), who believed that the mind of an infant is a **tabula rasa**, or "blank slate," and that children have no inborn tendencies. In other words, children are neither inherently

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baby biography
a detailed record of an infant's growth and development over a period of time.

good nor inherently bad, and how they turn out depends entirely on their worldly experiences. Locke argued in favour of disciplined child rearing to ensure that children would develop good habits and acquire few bad ones.

These philosophers also differed on the question of children's participation in their own development. Hobbes maintained that children must learn to rechannel their naturally selfish interests into socially acceptable outlets; in this sense, they are passive subjects to be moulded by parents. Locke, too, believed that the child's role is passive because the mind of an infant is a blank slate on which experience writes its lessons. But a strikingly different view was proposed by Rousseau, who believed that children are actively involved in the shaping of their own intellects and personalities. In Rousseau's words, the child is not a "passive recipient of the tutor's instruction" but a "busy, testing, motivated explorer. The active searching child, setting his own problems, stands in marked contrast to the receptive one . . . on whom society fixes its stamp" (quoted in Kessen, 1965, p. 75).

Clearly, these philosophers had some interesting ideas about children and child rearing. But how could anyone decide whether their views were correct? Unfortunately, the philosophers collected no objective data to back their pronouncements, and the few observations they did make were limited and unsystematic. Can you anticipate the next step in the evolution of the developmental sciences?

Children as Subjects of Study: The Baby Biographies. The first glimmering of a systematic study of children can be traced to the late 19th century. This was a period in which investigators from a variety of academic backgrounds began to observe the development of their own children and to publish these data in works known as **baby biographies**.

Perhaps the most influential of the baby biographers was Charles Darwin, who made daily records of the early development of his son (Darwin, 1877; and see Charlesworth, 1992). Darwin's curiosity about child development stemmed from his theory of evolution. Quite simply, he believed that young, untrained infants share many characteristics with their nonhuman ancestors, and he advanced the (now discredited) idea that the development of the individual child retraces the entire evolutionary history of the species, thereby illustrating the "descent of man." So Darwin and many of his contemporaries viewed the baby biography as a means of answering questions about our evolutionary past.

Baby biographies left much to be desired as works of science. Different baby biographers emphasized very different aspects of their children's behaviour, so that different baby biographies were difficult to compare. In addition, parents are not entirely objective about their own children, and baby biographers may also have let their assumptions about the nature of development bias their observations so that they "found" what they were looking for. Finally, each baby biography was based on a single child—and often the child of a distinguished individual. Conclusions based on a single case may not hold true for other children.

Despite these shortcomings, baby biographies were a step in the right direction. The fact that eminent scientists such as Charles Darwin were now writing about developing children implied that human development was a topic worthy of scientific scrutiny.

Development of Children's Rights in Canada

Issues regarding children's rights evolved to match the development of the concept of childhood. For example, societies had to struggle with defining who was responsible for children—society or parents—as well as defining how to protect children. Canadian public policy on the rights of children demonstrates the struggle that societies faced in their efforts to cope with the evolving concept of childhood and the inherent changes in the responsibilities of parents and society. Brian Howe (1995), at the University College of Cape Breton, identifies three changes in Canadian policy that reflect the historical changes outlined above. Canadian children moved from being viewed as family property to dependants in need of state protection. Slowly this gave way to the recognition that children were semi-independent individuals with rights of their own. Now society is moving toward a recognition that children are entities in their own right and should be afforded the economic security guaranteed to other members of society.

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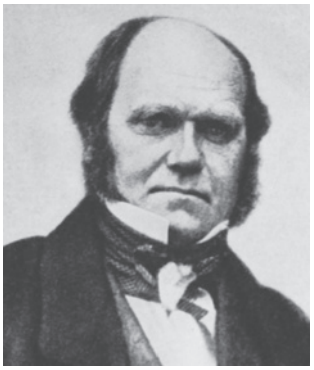

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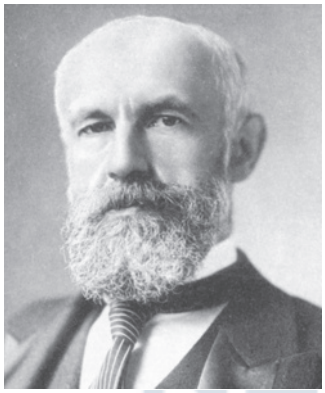
Charles Darwin (1809–1882) recorded baby biographies that stimulated interest in the study of development.



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American psychologist G. Stanley Hall (1846–1924) is recognized as one of the founders of developmental psychology.

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Sigmund Freud (1856–1939) developed one of the first theories to explain development.

theory
a set of concepts and propositions designed to organize, describe, and explain an existing set of observations.

hypothesis
a theoretical prediction about some aspect of experience.

Origins of a Science of Development

G. Stanley Hall conducted the first large-scale scientific investigation of children, and because of this he is considered by most to be the founder of developmental psychology as a research discipline (White, 1992). Well aware of the shortcomings of baby biographies, Hall set out in the late 19th century to collect more objective data on larger samples. Specifically, he was interested in children's thinking, and he developed a now familiar research tool—the *questionnaire*—to explore "the contents of children's minds" (Hall, 1891). By asking children questions about a range of topics, Hall discovered that children's understanding of the world grows rapidly during childhood and that the "logic" of young children is not very logical at all. Hall later wrote an influential book titled *Adolescence* (1904) that was the first work to call attention to adolescence as a unique phase of the human life span.

At about the time Hall was using questionnaires to study children's minds, a young European neurologist was trying a different method of probing the mind and revealing its contents. The neurologist's approach was very fruitful, providing information that led him to propose a theory that revolutionized thinking about children and childhood. The neurologist was Sigmund Freud. His ideas came to be known as *psychoanalytic theory*.

In many areas of science, new theories are often revisions or modifications of old theories. But in Freud's day, there were few "old" theories of human development to modify. Freud was truly a pioneer, formulating his psychoanalytic theory from the thousands of notes and observations he made while treating patients for various kinds of emotional disturbances.

Freud's highly creative and unorthodox theorizing soon attracted a lot of attention. Shortly after the publication of Freud's earliest theoretical monographs, the *International Journal of Psychoanalysis* was founded and other researchers began to report their tests of Freud's thinking. By the mid-1930s, much of Freud's work had been translated into other languages and the impact of psychoanalytic theory was felt around the world. Over the years, Freud's theory continued to generate new research and prompt other researchers to revise and extend Freud's thinking. The field of developmental psychology was thriving by the time Freud died in 1939.

Freud's work—and other scientists' reactions to it—aptly illustrates the role that theories play in the science of human development. Although the word *theory* is an imposing term, theories are something that everybody has. If we were to ask you why males and females appear to be very different as adults when they seem so very similar as infants, you would undoubtedly have some opinions on the issue. Your answer would state or at least reflect your own underlying theory of the development of sex differences. So a **theory** is a set of concepts and propositions that describe and explain some aspect of experience. In the field of psychology, theories help us to describe and explain various patterns of behaviour.

Good theories have another important feature: the ability to predict future events. These theoretical predictions, or **hypotheses**, are then tested by collecting data. The information we obtain when testing hypotheses provides information about the theory's ability to explain new observations. It may also lead to new theoretical insights that extend our knowledge even further.

Today there are many theories that have contributed to our understanding of child and adolescent development, and in Chapter 2 we will examine several of the more influential of these viewpoints. Although it is natural for people reading about various theories to favour one, the scientist uses a rather stringent yardstick to evaluate theories: He or she will formulate hypotheses and conduct research to determine whether the theory can adequately predict and explain new observations. Thus, there is no room for subjective bias when evaluating a theory. Theories in the developmental sciences are only as good as their ability to predict and explain important aspects of development.

In the next section of the chapter, we will focus on the research methods that developmentalists use to test their theories and gain a better understanding of child and adolescent development.

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Research Strategies: Basic Methods and Designs

GFX

When detectives are assigned cases to solve, they first gather the facts and formulate hunches, and then sift through the clues or collect additional information until one of their hunches proves correct. Unravelling the mysteries of development is in many ways a similar endeavour. Investigators must carefully observe their subjects, analyze the information they collect, and use these data to draw conclusions about the ways people develop. Let's look at this approach in more detail.

Research Methods in Child and Adolescent Development

Our focus in this section is on the methods that researchers use to gather information about developing children and adolescents. Our first task is to understand why developmentalists consider it absolutely essential to collect all these facts. We will then discuss the advantages and disadvantages of different fact-finding strategies: self-report methodologies, systematic observation, case studies, ethnography, and psychophysiological methods. Finally, we will consider the ways developmentalists might design their research to detect and explain age-related changes in children's feelings, thoughts, abilities, and behaviours.

The Scientific Method

scientific method
the use of objective and replicable methods to gather data for the purpose of testing a theory or hypothesis. It dictates that, above all, investigators must be objective and must allow their data to decide the merits of their thinking.

Modern developmental psychology is appropriately labelled a scientific enterprise because those who study development have adopted the **scientific method**, which guides their attempts at understanding. There is nothing mysterious about the scientific method. It refers to the use of objective and replicable methods to gather data for the purpose of testing a theory or hypothesis. By *objective* we mean that everyone who examines the data will come to the same conclusions; that is, it is not a subjective opinion. By *replicable* we mean that every time the method is used, it results in the same data and conclusions. Thus, the scientific method dictates that, above all, investigators must be *objective* and must allow their data to decide the merits of their thinking.

In earlier eras, when social philosophers such as Hobbes, Locke, and Rousseau were presenting their views on children and child rearing, their largely unsubstantiated claims were often accepted as fact. People assumed that great minds always had great insights. Very few individuals questioned the word of well-known scholars because the scientific method was not yet a widely accepted criterion for evaluating knowledge.

WHAT DO YOU THINK? ?

What might you say to a person who rejects an established finding by saying, "It didn't happen that way for my child"? If this parent's recollection is accurate, does this invalidate the finding?

The intent here is not to criticize the early social philosophers. However, great minds may on occasion produce miserable ideas that can do a great deal of harm if those ideas are uncritically accepted and influence the way people are treated. The scientific method, then, is a valuable safeguard that helps to protect the scientific community and society at large against flawed reasoning (Machado & Silva, 2007). Protection is provided by the practice of evaluating the merits of various theoretical pronouncements against the objective record, rather than simply relying on the academic, political, or social credibility of the theorist. Of course, this also means that the theorist whose ideas are being evaluated must be equally objective and willing to discard pet notions when there is evidence against them.

Gathering Data: Basic Fact-Finding Strategies

reliability
the extent to which a measuring instrument yields consistent results, both over time and across observers.

validity
the extent to which a measuring instrument accurately reflects what the researchers intended to measure.

No matter what aspect of development we hope to study—be it the perceptual capabilities of newborn infants, the growth of friendships among elementary school children, or the reasons some adolescents begin to use drugs—we must find ways to *measure* what interests us. Today, researchers are fortunate in having many tried-and-true procedures they might use to measure behaviour and to test their hypotheses about human development. But regardless of the technique employed, scientifically useful measures must always display two important qualities: **reliability** and **validity**.

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A measure is *reliable* if it yields consistent information over time and across observers. Suppose you go into a classroom and record the number of times each child behaves aggressively toward others, but your research assistant, using the same scheme to observe the same children, does not agree with your measurements. Or you measure each child's aggressiveness one week but come up with very different aggressiveness scores while applying the same measure to the same children a week later. Clearly, your observational measure of aggression is *unreliable* because it yields highly inconsistent information. To be reliable and thus useful for scientific purposes, your measure would have to produce comparable estimates of children's aggression from independent observers (*interrater reliability*) and yield similar scores for individual children from one testing to another shortly thereafter (*temporal stability*).

A measure is *valid* if it measures what it is supposed to measure. An instrument must be reliable before it can possibly be valid. Yet reliability, by itself, does not guarantee validity (Miller, 1997). For example, a highly reliable observational scheme intended as a measure of children's aggression may provide grossly overinflated estimates of aggressive behaviour if the investigator simply classifies all acts of physical force as examples of aggression. What the researcher has failed to recognize is that much high-intensity behaviour may simply represent enjoyable forms of rough-and-tumble play without harmful or aggressive intent. Researchers must demonstrate they are measuring the attribute they say they are measuring before we can have much faith in the data they collect or the conclusions they reach.

Keeping in mind the importance of establishing the reliability and validity of measures, let us consider some of the different ways in which aspects of human development might be measured.

Self-Report Methodologies. Three common procedures developmentalists use to gather information and test hypotheses are interviews, questionnaires (including psychological tests), and the clinical method. Although these approaches are similar in that each asks participants to answer questions posed by the investigator, they differ in the extent to which the investigator treats individual participants alike.

Interviews and Questionnaires. Researchers who opt for interview or questionnaire techniques ask the child, or the child's parents, a series of questions pertaining to such aspects of development as the child's behaviour, feelings, beliefs, or characteristic methods of thinking. Collecting data via a questionnaire (and most psychological tests) simply involves putting questions on paper and asking participants to respond to them in writing, whereas interviews require participants to respond orally to the investigator's queries. If the procedure is a **structured interview** or **structured questionnaire**, all who participate in the study are asked the same questions in the same order. The purpose of this standardized or structured format is to treat each person alike so that the responses of different participants can be compared.

structured interview or structured questionnaire
a technique in which all participants are asked the same questions in precisely the same order so that the responses of different participants can be compared.

One interesting use of the interview technique is a project in which kindergarten, Grade 2, and Grade 4 children responded to 24 questions designed to assess their knowledge of social stereotypes about males and females (Williams, Bennett, & Best, 1975). Each question came in response to a different short story in which the central character was described by either stereotypically masculine adjectives (for example, *aggressive*, *forceful*, *tough*) or stereotypically feminine adjectives (for example, *emotional*, *excitable*). The child's task was to indicate whether the character in each story was male or female. Williams and his associates found that even kindergartners could usually tell whether the stories referred to boys or girls. In other words, these 5-year-olds were quite knowledgeable about gender stereotypes, although children's thinking became more stereotyped between kindergarten and Grade 2. One implication of these results is that stereotyping of the sexes must begin very early if kindergartners are already thinking along stereotyped lines.

diary study
a questionnaire method in which participants write answers to specified questions in a diary or notebook, either at specified times or when prompted by an electronic pager.

A very creative use of interview or questionnaire methodologies is the so-called **diary study**, in which participants—usually adolescents or young adults—respond, in a diary or a notebook, to one or more standardized questions, either at a specified time (for example, at the end of the day) or whenever they are instructed to respond by a prompt

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from an electronic pager. Diary studies have proved invaluable for investigating a host of issues that may be difficult to study in other ways. For example, Nancy Galambos from the University of Alberta and her colleagues (Galambos, Dalton, & Magg, 2009) used diary data to examine the relationship between sleep quality and psychosocial adjustment in a sample of Canadian students in their first semester of university.

Nevertheless, interviews and questionnaires have some very real shortcomings. Although some accommodations can be made for young children—such as using variations of smiley-faces as a rating scale instead of numbers or words (Egan, Santos, & Bloom, 2007)—neither approach can be used with very young children, who cannot read or comprehend speech very well. Investigators must also hope that the answers they receive are honest and accurate and are not merely attempts by respondents to present themselves in a favourable or socially desirable way. Many adolescents, for example, may be unwilling to admit they cheat on schoolwork, or smoke marijuana, or enjoy the risks of shoplifting. Clearly, inaccurate or untruthful responses lead to erroneous conclusions. Investigators must also be careful to ensure that participants of all ages interpret questions in the same way; otherwise, the age trends observed in the study may reflect differences in children's ability to comprehend and communicate rather than real underlying changes in their feelings, thoughts, or behaviours. Finally, researchers who interview both developing children and their parents (or teachers) may have trouble determining which set of reports is more accurate if the children's descriptions of their own behaviours differ from those of the other informants (Hussong, Zucker, Wong, Fitzgerald, & Puttler, 2005).

Despite these potential shortcomings, structured interviews and questionnaires can be excellent methods of obtaining large amounts of useful information in a short time. Both approaches are particularly useful when the investigator emphasizes to participants that their responses will be confidential and/or challenges them to report exactly what they know about an issue, thereby maximizing the likelihood of a truthful or accurate answer. In the gender stereotyping study, for example, the young participants probably considered each question a personal challenge or a puzzle to be solved and were thus motivated to answer accurately and to display exactly what they knew about males and females. Under the circumstances, then, the structured interview was an excellent method of assessing children's perceptions of the sexes.

clinical method
a type of interview in which a participant's response to each successive question (or problem) determines what the investigator will ask next.

The Clinical Method. The **clinical method** is very similar to the interview technique. The investigator is usually interested in testing a hypothesis by presenting the research participant with a task or stimulus of some sort and then inviting a response. After the participant responds, the investigator typically asks a second question or introduces a new task to clarify the participant's original answer. Although participants are often asked the same questions initially, each participant's answer determines what he or she is asked next. Thus, the clinical method is a flexible approach that considers each participant to be unique.

Jean Piaget, a famous Swiss psychologist, relied extensively on the clinical method to study children's moral reasoning and intellectual development. The data from Piaget's research are largely protocol records of his interactions with individual children. Here is a small sample from Piaget's work (1932/1965, p. 140) on the development of moral reasoning, which shows that this young child thinks about lying in a very different way than adults do:

> Do you know what a lie is?—*It's when you say what isn't true*.—Is 2 + 2 = 5 a lie?—*Yes, it's a lie*.—Why?—*Because it isn't right*.—Did the boy who said 2 + 2 = 5 know it wasn't right or did he make a mistake?—*He made a mistake*.—Then if he made a mistake, did he tell a lie or not?—*Yes, he told a lie*.

Like structured interviews, clinical methods are often useful for gathering large amounts of information in relatively brief periods. This strategy's flexibility is also an advantage: By asking follow-up questions that are tailored to the participant's original answers, it is often possible to obtain a rich understanding of the meaning of those answers. However, the flexibility of the clinical method is also a potential shortcoming. It may be difficult, if not impossible, to directly compare the answers of participants who are asked different questions. Furthermore, tailoring one's questions to the participant's responses

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Investigators using the clinical method. All participants are asked the same questions at first, but each participant's answers to these initial questions determine what the researcher will ask next.

raises the possibility that the examiner's pre-existing theoretical biases may affect the particular follow-up questions asked and the interpretations provided. Because conclusions drawn from the clinical method depend, in part, on the investigator's *subjective* interpretations, it is always desirable to verify these insights using other research techniques.

Observational Methodologies. Often researchers prefer to observe people's behaviour directly rather than asking them questions about it. One method that many developmentalists favour is **naturalistic observation**—observing people in their common, everyday (that is, natural) surroundings (Pellegrini, 1996). To observe children, this usually means going into homes, schools, or public parks and playgrounds and carefully recording what they do. Rarely will the investigator try to record every event that occurs; they are usually testing a specific hypothesis about one type of behaviour, such as cooperation or aggression, and will focus their attention and data collection exclusively on acts of this kind. One strength of naturalistic observation is the ease with which it can be applied to infants and toddlers, who often cannot be studied through methods that demand verbal skills. A second strength of naturalistic observation is that it illustrates how people actually behave in everyday life (Willems & Alexander, 1982).

naturalistic observation
a method in which the scientist tests hypotheses by observing people as they engage in everyday activities in their natural habitats (for example, at home, at school, or on the playground).

However, naturalistic observation also has its limitations. First, some behaviours occur so infrequently (for example, heroic rescues) or are so socially undesirable (for example, criminal acts or morally reprehensible behaviours) that they are unlikely to be witnessed by an unknown observer in the natural environment. Second, many events are usually happening at the same time in a natural setting, and any (or some combination) of them may affect people's behaviour. This makes it difficult to pinpoint the causes of participants' actions or of any developmental trends in behaviour. Finally, the mere presence of an observer can sometimes makes people behave differently than they otherwise would. Children may "show off" when they have an audience, whereas parents may be on their best behaviour, showing a strong reluctance, for example, to spank a misbehaving child as they normally might. For these reasons, researchers often attempt to minimize **observer influence** by (1) videotaping their participants from a concealed location or (2) spending time in the setting before collecting their "real" data so that the individuals they are observing will grow accustomed to their presence and behave more naturally.

observer influence
tendency of participants to react to an observer's presence by behaving in unusual ways.

Joanna Cotton

Children's tendency to perform for observers is one of the problems that researchers must overcome when using the method of naturalistic observation.

Several years ago, Mary Haskett and Janet Kistner (1991) conducted an excellent piece of naturalistic observation to compare the social behaviours of nonabused preschoolers with those of daycare classmates identified by child protection agencies as having been physically abused by their parents. The investigators first defined examples of the behaviours they wished to record—both *desirable* behaviours, such as appropriate social initiations and positive play, and *undesirable* behaviours, such as aggression and negative verbalizations. They then monitored 14 abused and 14 nonabused preschool children as the children mingled with peers in a play area of a daycare facility. Observations were made

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time-sampling
a procedure in which the investigator records the frequencies with which individuals display particular behaviours during the brief time intervals that each is observed.

using a **time-sampling** procedure: Each child was observed during three 10-minute play sessions on three different days. To minimize their influence on the play activities, observers stood outside the play area while making their observations.

The results were disturbing. As shown in **Figure 1.1**, abused children initiated fewer social interactions than their nonabused classmates and were somewhat socially withdrawn. And when they did interact with playmates, the abused youngsters displayed more aggressive acts and other negative behaviours than did their nonabused companions. Indeed, nonabused children often blatantly ignored the positive social initiations of an abused child, as if they did not want to get involved with him or her.

Tragically, Haskett and Kistner's observational study shows that abused children are unattractive playmates who are likely to be disliked and even rejected by peers. But as is almost always the case in naturalistic observational research, it is difficult to pinpoint the exact cause of these findings. Did the negative behaviours of abused children cause their peers to reject them? Or did peer rejection cause the abused children to display negative behaviours? Either possibility or another could account for Haskett and Kistner's results.

structured observation
an observational method in which the investigator cues the behaviour of interest and observes participants' responses in a laboratory.

How might observational researchers study unusual or undesirable behaviours that they are unlikely to observe in the natural environment? One way is to conduct **structured observations** in the laboratory. In a structured observational study, each participant is exposed to a setting that might cue the behaviour in question and is then surreptitiously observed (via a hidden camera or through a one-way mirror) to see if he or she performs the behaviour. For example, Leon Kuczynski from the University of Guelph (1983) got children to promise to help him with a boring task and then left them alone to work in a room where attractive toys were present. This procedure enabled Kuczynski to determine whether children would break a promise to work when they thought there was no one present to observe their transgression. Kuczynski found that some of the children did break the promise to work so they could play with the toys, whereas others continued with the work even when they thought no one was watching.

Aside from being a most feasible way of studying behaviours that occur infrequently or are not openly displayed in the natural environment, structured observations also ensure that every participant in the sample is exposed to the *same* eliciting stimuli and has an *equal opportunity* to perform the target behaviour—circumstances that are not always true in the natural environment. Of course, the major disadvantage of structured observation is that participants may not always respond in a contrived laboratory setting as they would in everyday life.

In an interesting example of structured observation, Tronick and his colleagues (Tronick et al., 2005) studied the interaction between 4-month-olds and their mothers, with a specific interest in how the mother–infant interactions of babies prenatally exposed to cocaine compared to those of nonexposed infants. To find out, they brought 695 mother–infant pairs into a laboratory setting, 236 of whom had been exposed to cocaine prenatally. Cameras were positioned so that both the infant's face and the mother's face were videotaped for three two-minute periods. During the first two minutes, mother and child were allowed to interact normally. During the second period the mother was instructed to present a "still face" to the infant; that is, she was told not to laugh, smile, talk to, or touch the infant. During the third two-minute period, the mother was to resume normal interaction with her child. This face-to-face still-face procedure allowed the researcher to observe the interactions of interest in a little over six minutes, rather than travelling to 695 different homes and waiting for hours and hours for the behaviours to occur.

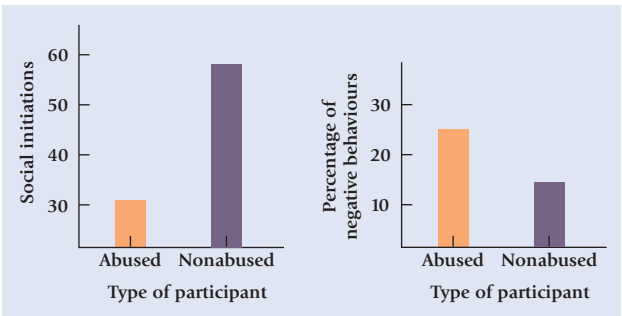

Figure 1.1 Social initiations and negative behaviours of abused and nonabused preschool children. Compared with their nonabused companions, abused youngsters initiate far fewer social interactions with peers and behave much more negatively toward them.

As Tronick and colleagues suspected, the interaction patterns of the cocaine-exposed mother–infant pairs were different from those of the nonexposed pairs. For the most part, the cocaine-exposed infants and their mothers did not appear to be engaged in the kind of social interaction that facilitates both social and cognitive development in later months. Previous research suggests that the quality of caregiver–infant interactions is extremely important to the healthy social and cognitive development of

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very young children (Ainsworth, 1979, 1989). Positive, synchronized interactions provide the infant with the foundation for forming other positive, supportive relationships later on in life. Such relationships also enable the child to investigate objects and the rest of the world without excessive fear (Bowlby, 1973, 1988).

Unfortunately, compared to nonexposed infants, the cocaine-exposed 4-month-olds were hypervigilant: They spent more time monitoring their mothers' reactions and behaviours and less time exploring the toys in the lab. In addition, the interactions of the cocaine-exposed pairs were less synchronized: Often the child would be emotionally neutral while the mother was emotionally negative. In the highest-exposure group, mother and infant spent more time negatively engaged and less time positively engaged than all other pairs. Overall, the cocaine-exposed infants hiccupped and spit up more than their nonexposed peers, and those with the highest exposure were more passive and distant than both nonexposed infants and those exposed to lower levels of cocaine. Despite these differences, however, when the mothers presented the still face, the cocaine-exposed 4-month-olds behaved in the same way as the nonexposed infants: They expected mothers to be engaged with them, so the still face was surprising, frustrating, and even stressful. Tronick and colleagues pointed out that the cocaine-exposed infants' behaviours during the still-face episode indicated that the infants did have the ability to interact and connect with their caregivers. The infants' behaviours also suggested that their mothers were providing some degree of social interaction and that this offered hope that intervention strategies might improve the developmental outcomes of the cocaine-exposed babies.

Case Studies. Any or all of the methods we have discussed—structured interviews, questionnaires, clinical method, and behavioural observations—can be used to compile a detailed portrait of a single individual's development through the **case study** method. In preparing an individualized record, or case, the investigator typically seeks many kinds of information about the participant, such as his or her family background, socioeconomic status, health records, academic or work history, and performance on psychological tests. Much of the information included in any case history comes from interviews with and observations of the individual, although the questions asked and observations made are typically not standardized and may vary considerably from case to case.

case study
a research method in which the investigator gathers extensive information about the life of an individual and then tests developmental hypotheses by analyzing the events of the person's life history.

Case studies may also be used to describe groups. For example, Michael Bamburg (2004) conducted a project investigating identity development in 10-, 12-, and 15-year-old boys. During the project, information was collected from journal entries, oral accounts, open-ended one-on-one interviews, and group discussions. From the information collected, Bamburg chose an excerpt from a single segment of conversation to illustrate how adolescent males construct their identities within the moment-to-moment course of a conversation. During the conversation, five Grade 9 boys discussed a rumour they had heard during the previous school year that related the story of a sexually active female classmate who had supposedly revealed in a letter that she was pregnant. One of the 9th-graders in the discussion group claimed to have read the letter, which had been passed around among several boys at the school. Bamburg notes that as the discussion unfolds, the girl is portrayed as more and more irresponsible, attention seeking, and sexually promiscuous. The boys state that she was having sex with many boys, and "more than just sex." They portray her as wanting the letter to "accidentally" fall into the wrong hands so that many students would read it, implying that the boy who claimed to have read the letter had violated no privacy rights.

Bamburg argues that one of the ways that people make sense of themselves and others is through socially interactive conversation. He notes that as the boys discuss the rumour about the girl, they use her character to demonstrate their own stance on a higher moral ground. Bamburg found that the group's engagement in character assassination of the girl allows the boys to construe their identities as morally superior to and more adult than the girl's while also illustrating how the boys subtly endorse a stereotypic double standard for girls in comparison to boys. Thus, their conversation reveals more about themselves as they would like to be seen by the adult moderator of the discussion than it does about the girl's character. Analysis of the discussion also provides insight into how, as a group, adolescent boys develop and maintain attitudes that may

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adversely affect both themselves and adolescent girls. Because the boys protected and developed their identities and self-presentation in the conversation, this *group case study* reveals information that is different from what we might glean in an individual case study.

Although many developmentalists have used case studies to great advantage, there are major drawbacks to this approach. For example, it is often difficult to directly compare subjects who have been asked different questions, taken different tests, and been observed under different circumstances. Case studies may also lack *generalizability*; that is, conclusions drawn from the experiences of the small number of individuals studied may simply not apply to most people. The 9th-graders in Bamburg's discussion group, for example, were all from a large city in the eastern United States, and theories posited as a result of analyzing their discussion may not apply to boys in Canada or Finland or Southeast Asia. For these reasons, any conclusions drawn from case studies should always be verified through the use of other research techniques.

ethnography
method in which the researcher seeks to understand the unique values, traditions, and social processes of a culture or subculture by living with its members and making extensive observations and notes.

Ethnography. **Ethnography**—a form of participant observation often used in the field of anthropology—is becoming increasingly popular among researchers who hope to understand the effects of culture on developing children and adolescents. To collect their data, ethnographers often live for periods of months or even years within the cultural or subcultural community they are studying. The data they collect are typically diverse and extensive, consisting largely of naturalistic observations, notes made from conversations with members of the culture, and interpretations of these events. These data are eventually used to compile a detailed portrait of the cultural community and draw conclusions about how the community's unique values and traditions influence aspects of the development of its children and adolescents.

Detailed ethnographic portraits of a culture or subculture that arise from close and enduring contact with members of the community can lead to a richer understanding of that community's traditions and values than is possible through a small number of visits, in which outsiders make limited observations and conduct a few interviews (LeVine et al., 1994). Extensive cultural or subcultural descriptions are particularly useful to investigators hoping to understand cultural conflicts and other developmental challenges faced by minority children and adolescents in diverse multicultural societies (Segal, 1991; see also Patel, Power, & Bhavnagri, 1996). But despite these clear strengths, ethnography is a highly *subjective* method because researchers' own cultural values and theoretical biases can cause them to misinterpret what they have experienced. In addition, ethnographic conclusions pertain only to the culture or subculture studied and cannot be assumed to generalize to other contexts or social groups.

An example of ethnographic research was conducted by Posada colleagues (Posada, Carbonell, Alzate, & Plata, 2004). Because the various questionnaires and behavioural coding schemes typically used to assess caregiver–infant interactions were developed in studies using Caucasian middle-class participants from industrialized countries, Posada and colleagues chose ethnographic methods to assess mother–infant interactions in middle- to lower-middle-class families in Bogotá, Colombia. They then compared the results derived from observations made in the Colombian households to results derived using previously developed assessments.

In a traditionally ethnographic manner, observers made eight to nine two-hour, unstructured visits to 27 Colombian homes. During the visits, mothers were told to carry on with their daily routines, behaving as they normally would. The observers interacted with the families naturally. After each visit, they transcribed their observations. Repeat visits were conducted by the same observer.

From the observers' transcripts, 10 domains of maternal caregiving were identified. Using an inductive approach, two of the researchers and an ethnographic expert reviewed the transcripts. On first pass, they identified major caregiving themes. Then they reviewed the transcripts in more detail, focusing on specifying the major domains and identifying subdomains. In this way they were able to develop a set of culture-sensitive scales that could be used alongside previously developed measures in order to assess the universality of infant-sensitive maternal care.

The 10 scales of maternal sensitivity derived from the observations included domains such as promptness of response, enjoyment of interaction, interactive smoothness, and quality of physical contact. Results from the ethnographically derived Colombian scales

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Ethnographic researchers attempt to understand cultural influences by living within the community and participating in all aspects of community life.

were highly consistent with results from measures previously developed for Caucasian middle-class and upper-middle-class families, lending credence to the notion that sensitive caregiving behaviours are similar across cultures and socioeconomic circumstances, at least within the first few years of an infant's life.

Another example of ethnological research comes from the work of Gregory Bryant and Clark Barrett (Bryant & Barrett, 2007). They have been visiting and interacting with the Shuar people, a culture of hunter-horticulturalists living in the South American rainforest who have no experience with people from industrialized countries. Bryant and Barrett found evidence that Shuar adults are able to recognize infant-directed speech and even tell the difference between various intentions of speech (for example, prohibitions, attention, approval) in English, a language with which they have no experience. This exciting finding demonstrates a universality in infant-directed speech that was not known before because all previous research had been conducted with speakers from industrialized nations.

psychophysiological methods
methods that measure the relationships between physiological processes and aspects of children's physical, cognitive, social, or emotional behaviour/development.

Psychophysiological Methods. In recent years, developmentalists have turned to **psychophysiological methods**—techniques that measure the relationship between physiological responses and behaviour—to explore the biological underpinnings of children's perceptual, cognitive, and emotional responses. Psychophysiological methods are particularly useful for interpreting the mental and emotional experiences of infants and toddlers, who are unable to report such events (Bornstein, 1992).

Heart rate is an involuntary physiological response that is highly sensitive to psychological experiences. Compared to their normal resting, or *baseline,* levels, infants who are carefully attending to an interesting stimulus may show a decrease in heart rate, those who are uninterested in the stimulus may show no heart rate change, and others who are afraid of or angered by the stimulus may show a heart rate increase (Campos, Bertenthal, & Kermoian, 1992; Fox & Fitzgerald, 1990).

Measures of brain function are also very useful for assessing psychological state. For example, electroencephalogram (EEG) recordings of brain wave activity can be obtained by attaching electrodes to the scalp. Because different patterns of EEG activity characterize different arousal states, such as sleep, drowsiness, and alertness, investigators can track these patterns and determine how sleep cycles and other states of arousal change with age. Novel stimuli or events also produce short-term changes in EEG activity. So an investigator who hopes to test the limits of infant sensory capabilities can present novel sights and sounds and look for changes in brain waves (called *event-related potentials*, or *ERPs*) to determine whether these stimuli have been detected, or even discriminated, because two stimuli sensed as "different" will produce different patterns of brain activity (Bornstein, 1992). Researchers have used ERPs to explore infants' reactions to others' displays of emotions, finding that 7-month-olds attend more to facial displays of negative rather than positive (or neutral) emotions (Leppanen, Moulson, Vogel-Farley, & Nelson, 2007), and that 12-month-olds are more inclined to use negative rather than positive (or neutral) facial expressions as a guide for how they should be feeling or behaving in new and uncertain situations (Carver & Vaccaro, 2007). More recently, technological advances have made it possible to observe the brain "in action." Using MRI (magnetic resonance imaging) and fMRI (functional magnetic resonance imaging) technology, researchers can compare pictures taken before a subject engages in an activity and during the activity to see which areas of the brain were activated. The fMRI equipment, such as that found at the Robarts Institute at the University of Western Ontario and the London Health Sciences Centre, is allowing researchers to embark on new research.

Psychophysiological states of parents can also be examined in investigations of children's development. For example, the hormone oxytocin is thought to play a role in human attachment and social relationships. Recently, Feldman and her colleagues measured oxytocin levels in pregnant women across their pregnancies and after the birth of their children (Feldman, Weller, Zagoory-Sharon, & Levine, 2007). They found that the

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hormone levels across pregnancy predicted behavioral measures of bonding between the mothers and their babies after birth. Psychophysiological measures can also be used with older children and adolescents to assess aspects of development. As one example, blood pressure and cortisol levels have been found in adolescence to be accurate measures of chronic stress that is empirically related to chronic childhood poverty (Evans & Kim, 2007).

Though very useful, psychophysiological responses are far from perfect indicators of psychological states. Even though an infant's heart rate or brain wave activity may indicate that he or she is attending to a stimulus, it is often difficult to determine exactly which aspect of that stimulus (shape, colour, etc.) has captured attention. Furthermore, changes in physiological responses often reflect mood swings, fatigue, hunger, or even negative reactions to the physiological recording equipment, rather than a change in the infant's attention to a stimulus or emotional reactions to it. For these reasons, physiological responses are more likely to be valid indications of psychological experiences when participants (particularly very young ones) are initially calm, alert, and contented.

Table 1.2 provides a brief review of the data-gathering methods that we have examined thus far. In the sections that follow, we will consider how investigators might design their research to test hypotheses and detect developmental continuities and changes.

CONCEPT CHECK 1.1 Introduction to Developmental Psychology

Check your understanding of the science and history of developmental psychology by answering the following questions. Answers appear at the end of the chapter.

Multiple Choice: Select the best alternative for each question.

_____ 1. According to developmentalists, what are the primary causes of developmental change?
   a. maturation and recapitulation
   b. learning and experience
   c. experience and recapitulation
   d. maturation and learning

_____ 2. Among the following, who would NOT be considered a "developmentalist"?
   a. a sociologist
   b an anthropologist
   c. a historian
   d. all of the above might be considered developmentalists
   e. none of the above would be considered developmentalists

_____ 3. Anthony is a developmentalist who is interested in helping children to reach their full potential in math and reading skills. Anthony's goal is consistent with which of the following global goals of the developmental sciences?
   a. the description of development
   b. the explanation of development
   c. the optimization of development
   d. the reorganization of development

_____ 4. Enrique is a developmental psychologist. He studies children's adjustment following their parents' divorce and remarriage. He f nds that sullen children who become withdrawn and isolated after their parents divorce can be helped to become happier and more social through play therapy. Which aspect of development change does Enrique's research most ref ect?
   a. Development is a continual and cumulative process.
   b. Development is marked by plasticity.
   c. Development is a holistic process.
   d. Development depends upon the historical and cultural context in which it occurs.

Fill in the Blank: Fill in the blank with the appropriate word or phrase.

5. In the developmental sciences, typical patterns of change are called _____, whereas individual variations in patterns of change are called _____.

Matching: Match the area of developmental science with the specif c aspects of development that are studied.

Area of Developmental Science	Aspects of Development
6. _____ cognitive	a. bodily changes and sequencing of motor skills
7. _____ physical growth	b. emotions, personality, and relationships
8. _____ psychosocial	c. perception, language, learning, and thinking

Short Answer: Brief y answer the following question.

9. Explain the scientif c signif cance of "baby biographies." Why were these publications scientif cally f awed?

Essay: Provide a more detailed answer to the following question.

10. Describe differences in the historical and cultural context between your generation and your parents' generation. How might these differences have affected your development compared to that of your parents?

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TABLE 1.2 Strengths and Limitations of Seven Common Research Methods

Method	Strengths	Limitations
Self-reports		
Interviews and questionnaires	Relatively quick way to gather much information; standardized format allows the investigator to make direct comparisons between data provided by different participants.	Data collected may be inaccurate or less than completely honest, or may reflect variations in respondents' verbal skills and ability to understand questions.
Clinical method	Flexible methodology that treats subjects as unique individuals; freedom to probe can be an aid in ensuring that the participant understands the meaning of the questions asked.	Conclusions drawn may be unreliable in that participants are not all treated alike; flexible probes depend, in part, on the investigator's subjective interpretations of the participant's responses; can be used only with highly verbal participants.
Observational methodologies		
Naturalistic observation	Allows study of behaviour as it actually occurs in the natural environment.	Observed behaviours may be influenced by observer's presence; unusual or undesirable behaviours are unlikely to be observed during the periods when observations are made.
Structured observation	Offers a standardized environment that provides every child an opportunity to perform target behaviour; excellent way to observe infrequent or socially undesirable acts.	Contrived observations may not always capture the ways children behave in the natural environment.
Case studies	Very broad method that considers many sources of data when drawing inferences and conclusions about individual participants.	Kind of data collected often differs from case to case and may be inaccurate or less than honest; conclusions drawn from individual cases are subjective and may not apply to other people.
Ethnography	Provides a richer description of cultural beliefs, values, and traditions than is possible in brief observational or interview studies.	Conclusions may be biased by the investigator's values and theoretical viewpoints; results cannot be generalized beyond the groups and settings that were studied.
Psychophysiological methods	Useful for assessing biological underpinnings of development and identifying the perceptions, thoughts, and emotions of infants and toddlers, who cannot report them verbally.	Cannot indicate with certainty what participants sense or feel; many factors other than the one being studied can produce a similar physiological response.

Detecting Relationships: Correlational, Experimental, and Cross-Cultural Designs

Once researchers have decided what they want to study, they must devise a research plan, or design, that permits them to identify relationships among events and behaviours and to specify the causes of these relationships. Here we consider the three general research designs that investigators might employ: correlational, experimental, and cross-cultural designs.

The Correlational Design

correlational design
a type of research design that indicates the strength of associations among variables; though correlated variables are systematically related, these relationships are not necessarily causal.

In a **correlational design**, the investigator gathers information to determine whether two or more variables of interest are meaningfully related. If the researcher is testing a specific hypothesis (rather than conducting preliminary descriptive or exploratory research), he or she will be checking to see whether these variables are related as the hypothesis specifies they should be. No attempts are made to structure or manipulate the participants' environment in any way. Instead, correlational researchers take people as they find them—already "manipulated" by natural life experiences—and try to determine whether variations in people's life experiences are associated with differences in their behaviours or patterns of development.

To illustrate the correlational approach to hypothesis testing, let's work with a simple theory specifying that youngsters learn a lot from watching television and are apt to imitate the actions of the characters they observe. One hypothesis we might derive

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from this theory is that the more frequently children observe TV characters who display violent and aggressive acts, the more inclined they will be to behave aggressively toward their own playmates. After selecting a sample of children to study, our next step in testing our hypothesis is to measure the two variables that we think are related. To assess children's exposure to violent themes on television, we might use the interview or naturalistic observational methods to determine what each child watches and then count the number of aggressive acts that occur in this programming. To measure the frequency of the children's own aggressive behaviour toward peers, we could observe our sample on a playground and record how often each child behaves in a hostile, aggressive manner toward playmates. Having now gathered the data, it is time to evaluate our hypothesis.

correlation coefficient
numerical index, ranging from −1.00 to +1.00, of the strength and direction of the relationship between two variables.

The presence (or absence) of a relationship between variables can be determined by examining the data with a statistical procedure that yields a **correlation coefficient** (symbolized by an *r*). This statistic provides a numerical estimate of the strength and direction of the relationship between two variables. It can range in value from +1.00 to –1.00. The absolute value of *r* (disregarding its sign) tells us the *strength* of the relationship. Thus, correlation coefficients of –.70 and +.70 are of equal strength, and both are stronger than a moderate correlation of .30. An *r* of .00 indicates that the two variables are not systematically related. The sign of the correlation coefficient indicates the *direction* of the relationship. If the sign is positive, this means that as one variable increases, the other variable also increases. For example, height and weight are positively correlated: As children grow taller, they tend to get heavier (Tanner, 1990). Negative correlations indicate inverse relationships: As one variable increases, the other *decreases*. For example, Brett Friedman and her colleagues (Friedman et al., 2007) examined attention problems in children and found that the more attention problems children had when they were young, the poorer their thinking skills were when they were in late adolescence (see **Figure 1.2** for a visual display). Among elementary school students, for example, aggression and popularity are negatively correlated: Children who behave more aggressively tend to be less popular with their peers (Crick, 1996).

Now let's return to our hypothesized positive relationship between televised violence and children's aggressive behaviour. A number of investigators have conducted correlational studies similar to the one we have designed, and the results (reviewed in Liebert & Sprafkin, 1988) suggest a moderate positive correlation (between +.30 and +.50) between the two variables of interest: Children who watch a lot of violent television programming are more likely to behave aggressively toward playmates than are other children who watch little violent programming (see **Figure 1.3** for a visual display).

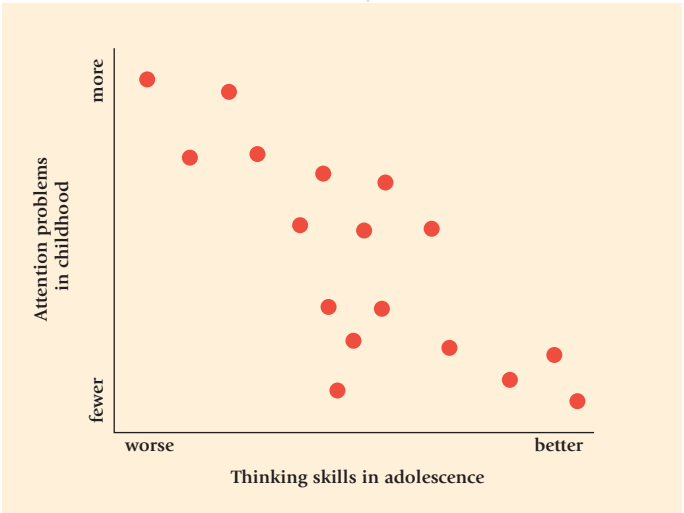

Figure 1.2 Plot of a hypothetical negative correlation between attention problems in childhood and thinking skills in late adolescence. Each dot represents a specific child who has more or fewer attention problems in childhood (shown on the vertical axis) and better or worse thinking skills in adolescence (shown on the horizontal axis). Although the correlation is less than perfect, we can see that having more attention problems in childhood is related to the child's thinking skills in adolescence.

Do these correlational studies establish that exposure to violent TV programming *causes* children to behave more aggressively? No, they do not! Although we have detected a relationship between exposure to televised violence and children's aggressive behaviour, the causal direction of the relationship is not at all indicated by this design. An equally plausible alternative explanation is that relatively aggressive children are more inclined to prefer violent programming. Another possibility is that the association between TV viewing and aggressive behaviour is actually caused by a third variable we have not measured. For example, perhaps parents who fight a lot at home (an unmeasured variable) cause their children to become more aggressive *and* to favour violent TV programming. If this were true, the latter two variables may be correlated, even though their relationship to each other is not one of cause and effect.

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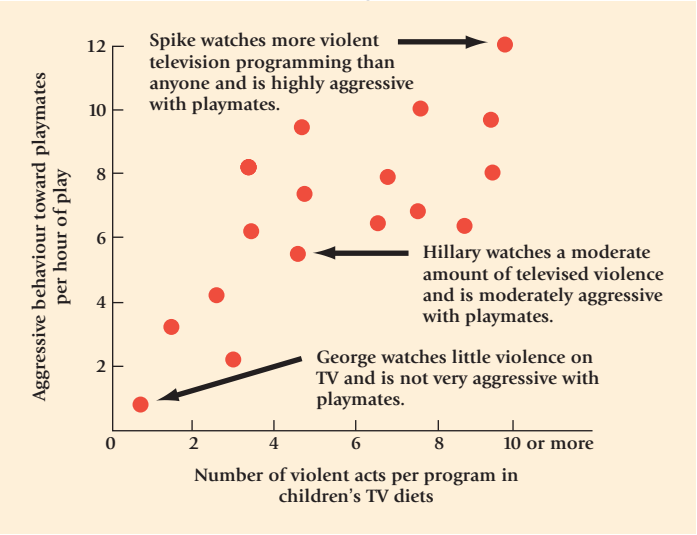
Spike watches more violent television programming than anyone and is highly aggressive with playmates.
Hillary watches a moderate amount of televised violence and is moderately aggressive with playmates.
George watches little violence on TV and is not very aggressive with playmates.
Aggressive behaviour toward playmates per hour of play
Number of violent acts per program in children's TV diets
0
2
4
6
8
10
12
10 or more

Figure 1.3 Plot of a hypothetical positive correlation between the amount of violence that children see on television and the number of aggressive responses they display. Each dot represents a specific child who views a particular level of televised violence (shown on the horizontal axis) and commits a particular number of aggressive acts (shown on the vertical axis). Although the correlation is less than perfect, we see that the more acts of violence a child watches on TV, the more inclined he or she is to behave aggressively toward peers.

In sum, the correlational design is a versatile approach that can detect systematic relationships between any two or more variables that we might be interested in and capable of measuring. However, its major limitation is that it cannot indicate that one thing causes another. How, then, might a researcher establish the underlying causes of various behaviours or other aspects of human development? One solution is to conduct experiments.

The Experimental Design

In contrast to correlational studies, **experimental designs** permit a precise assessment of the cause-and-effect relationship that may exist between two variables. Let's return to the issue of whether viewing violent television programming *causes* children to become more aggressively inclined. In conducting a laboratory experiment to test this (or any) hypothesis, we would bring participants to the lab, expose them to different treatments, and record their responses to these treatments as data.

The different treatments to which we expose our participants represent the **independent variable** of our experiment. To test the hypothesis we have proposed, our independent variable (or treatments) would be the type of television program that our participants observe. Half the children might view a program in which characters behave in a violent or aggressive manner toward others, whereas the other half would watch a program that contains no violence.

experimental design
a research design in which the investigator introduces some change in the participant's environment and then measures the effect of that change on the participant's behaviour.

independent variable
the aspect of the environment that an experimenter modif es or manipulates in order to measure its impact on behaviour.

dependent variable
the aspect of behaviour that is measured in an experiment and assumed to be under the control of the independent variable.

Children's reactions to the television shows would become the data, or **dependent variable**, in our experiment. Because our hypothesis centres on children's aggression, we would want to measure (as our dependent variable) how aggressively children behave after watching each type of television show. A dependent variable is called "dependent" because its value presumably "depends" on the independent variable. In the present case, we are hypothesizing that future aggression (our dependent variable) will be greater for children who watch violent programs (one variation of the independent variable) than for those who watch nonviolent programs (a second variation of the independent variable). If we are careful experimenters and exercise precise control over *all* other factors that may affect children's aggression, then finding the pattern of results that we have anticipated will allow us to draw a strong conclusion: Watching violent television programs *causes* children to behave more aggressively.

An experiment similar to the one we have proposed was actually conducted (Liebert & Baron, 1972). Half of the 5- to 9-year-olds in this study watched a violent three-minute clip from *The Untouchables*—one that contained two fistfights, two shootings, and a stabbing. The remaining children watched a three-minute film of a nonviolent but exciting track meet. So the *independent variable* was the type of program watched. Then each child was taken into another room and seated before a panel that had wires leading into an adjoining room. On the panel was a green button labelled HELP, a red button labelled HURT, and a white light between the buttons. The experimenter then told the child that another child in the adjoining room would soon be playing a handle-turning game that would illuminate the white light. The participant was told that by pushing the buttons when the light was lit, he or she could either *help* the other child by making the handle easy to turn or *hurt* the child by making the handle become very hot. When it was clear that the participant understood the instructions, the experimenter left the room and the light came on 20 times over the next several minutes. So each participant had 20 opportunities to help or hurt another child. The total amount of time each participant spent pushing the HURT button served as a measure of his or her aggression—the *dependent variable* in this study.

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WHAT DO YOU THINK? ?

Short of ridding all homes of televisions, what steps might concerned parents take to lessen the potentially harmful impacts of televised violence on young children? After formulating your plan, compare it to suggestions offered by the experts in **Table 17.2** on page 658.

The results were clear: Despite the availability of an alternative helping response, both boys and girls were much more likely to press the HURT button if they had watched the violent television program. So it appears that a mere three-minute exposure to televised violence can *cause* children to behave more aggressively toward a peer, even though the aggressive acts they witnessed on television bore no resemblance to those they committed themselves.

When students discuss this experiment in class, someone invariably challenges this interpretation of the results. For example, one student recently proposed an alternative explanation that "maybe the kids who watched the violent film were naturally more aggressive than those who watched the track meet." In other words, he was suggesting that a **confounding variable**—children's pre-existing levels of aggression—had determined their willingness to hurt a peer and that the independent variable (type of television program) had had no effect at all! Could this be correct? How do we know that the children in the two experimental conditions really didn't differ in some important way that may have affected their willingness to hurt a peer?

confounding variable
some factor other than the independent variable that, if not controlled by the experimenter, could explain any differences across treatment conditions in participants' performance on the dependent variable.

This question brings us to the crucial issue of **experimental control**. To conclude that the independent variable is causally related to the dependent variable, the experimenter must ensure that all other confounding variables that could affect the dependent variable are *controlled*—that is, equivalent in each experimental condition. One way to equalize these extraneous factors is to do what Liebert and Baron (1972) did: randomly assign children to their experimental treatments. The concept of *randomization*, or **random assignment**, means that each research participant has an equal probability of being exposed to each experimental treatment. Assignment of individual participants to a particular treatment is accomplished by an unbiased procedure such as the flip of a coin. If the assignment is truly random, there is only a very slim chance that participants in the two (or more) experimental treatments will differ on any characteristic that might affect their performance on the dependent variable. All of these confounding variables will have been randomly distributed within each treatment and equalized across the different treatments. Because Liebert and Baron randomly assigned children to experimental treatments, they could be reasonably certain that children who watched the violent TV program were not naturally more aggressive than those who watched the nonviolent TV program. So it was reasonable for them to conclude that the former group of children were more aggressive *because* they had watched a TV program in which violence and aggression were central.

experimental control
steps taken by an experimenter to ensure that all extraneous factors that could inf uence the dependent variable are roughly equivalent in each experimental condition; these precautions must be taken before an experimenter can be reasonably certain that observed changes in the dependent variable were caused by manipulation of the independent variable.

random assignment
control technique in which participants are assigned to experimental conditions through an unbiased procedure so that the members of the groups are not systematically different from one another.

The greatest strength of the experimental method is its ability to establish unambiguously that one thing causes another. Yet critics of laboratory experimentation have argued that the tightly controlled laboratory environment is often contrived and artificial and that children are likely to behave differently in these surroundings than they would in a natural setting. Urie Bronfenbrenner (1977) charged that a heavy reliance on laboratory experiments made developmental psychology "the science of the strange behaviour of children in strange situations with strange adults" (p. 19). Similarly, Robert McCall (1977) noted that experiments tell us what *can* cause a developmental change but do not necessarily pinpoint the factors that *actually do* cause such changes in natural settings. Consequently, it is quite possible that conclusions drawn from laboratory experiments do not always apply to the real world. One step that scientists can take to counter this criticism and assess the **ecological validity** of their laboratory findings is to conduct a *field experiment*.

ecological validity
state of affairs in which the f ndings of one's research are an accurate representation of processes that occur in the natural environment.

The Field Experiment. How can we be more certain that a conclusion drawn from a laboratory experiment also applies in the real world? One way is to seek converging evidence for that conclusion by conducting a similar experiment in a natural setting—that is, a **field experiment**. This approach combines all the advantages of naturalistic observation with the more rigorous control that experimentation allows. In addition, participants are typically not apprehensive about participating in a "strange" experiment because all the activities they undertake are everyday activities. They may not even be aware that they are participating in an experiment.

field experiment
an experiment that takes place in a naturalistic setting such as home, school, or playground.

Let's consider a field experiment (Leyens, Parke, Camino, & Berkowitz, 1975) that sought to test the hypothesis that heavy exposure to media violence can cause viewers to become more aggressive. The participants were Belgian boys who lived together in cottages

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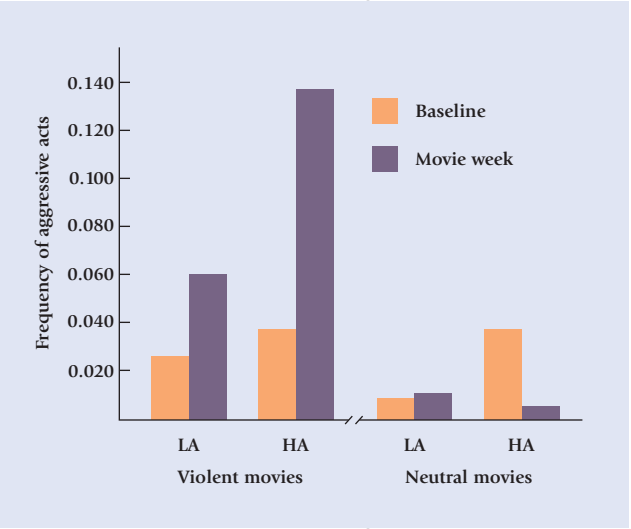

Figure 1.4 Mean physical aggression scores in the evening for highly aggressive (HA) and less aggressive (LA) boys under baseline conditions and after watching violent or neutral movies. *Adapted from "Effects of Movie Violence on Aggression in a Field Setting as a Function of Group Dominance and Cohesion," by J.P. Leyens, R.D. Parke, L. Camino, & L. Berkowitz, 1975,* Journal of Personality and Social Psychology, 1, *pp. 346-60. Copyright © 1975 by the American Psychological Association. Adapted with permission.*

at a minimum-security institution for adolescents. Before the experiment began, the experimenters observed each boy in their research sample to measure his characteristic level of aggression. These initial assessments served as a baseline against which future increases in aggression could be measured. The baseline observations suggested that the institution's four cottages could be divided into two subgroups consisting of two cottages populated by relatively aggressive boys and two cottages populated by less aggressive peers. Then the experiment began. For a period of one week, violent movies (such as *Bonnie and Clyde* and *The Dirty Dozen*) were shown each evening to one of the two cottages in each subgroup and neutral films (such as *Daddy's Fiancée* and *La Belle Américaine*) were shown to the other cottages. Instances of physical and verbal aggression among residents of each cottage were recorded twice daily (at lunchtime and in the evenings after the movie) during the movie week and once daily (at lunchtime) during a post-treatment week.

The most striking result of this field experiment was the significant increase in physical aggression that occurred in the evenings among residents of both cottages assigned to the violent-film condition. Because the violent movies contained a large number of physically aggressive incidents, it appears that they evoked similar responses from the boys who watched them. But as shown in **Figure 1.4**, violent movies prompted larger increases in aggression among boys who were already relatively high in aggression. Exposure to the violent movies caused the highly aggressive boys to become more verbally aggressive as well—an effect that these boys continued to display through the movie week and the post-treatment week.

The results of the Belgian field experiment are consistent with Liebert and Baron's (1972) laboratory study in suggesting that exposure to media violence does instigate aggressive behaviour. Yet it also qualifies the laboratory findings by implying that the instigating effects of media violence in the natural environment are likely to be stronger and more enduring for the more aggressive members of the audience.

The Natural (or Quasi-) Experiment. There are many issues to which an experimental design either cannot be applied or should not be used for ethical reasons. Suppose, for example, that we wish to study the effects of social deprivation in infancy on children's intellectual development. Clearly, we cannot ask one group of parents to subject their infants to social deprivation for two years so that we can collect the data we need. It is unethical to subject children to any experimental treatment that would adversely affect their physical or psychological well-being.

natural (or quasi-) experiment a study in which the investigator measures the impact of some naturally occurring event that is assumed to affect people's lives.

However, we might be able to accomplish our research objectives through a **natural** (or **quasi-**) **experiment** in which we observe the consequences of a natural event that participants have experienced. If we were able to locate a group of children who had been raised in impoverished institutions with very limited contact with caregivers over the first two years, we could compare their intellectual development with that of children raised at home with their families. This comparison would provide valuable information about the likely effect of early social deprivation on children's intellectual development. The "independent variable" in a natural experiment is the "event" that participants experience (in our example, the social deprivation experienced by institutionalized infants). The "dependent variable" is whatever outcome measure one chooses to study (in our example, intellectual development).

Let's note, however, that researchers conducting natural experiments do not control the independent variable, nor do they randomly assign participants to experimental treatments. Instead, they merely observe and record the apparent outcomes of a natural event. And in the absence of tight experimental control, it is often hard to determine precisely what factor is responsible for any group differences that are found. Suppose, for

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example, that our socially deprived institutionalized children showed a pattern of poorer intellectual outcomes than children raised at home. Is the *social deprivation* that institutionalized children experienced the factor that caused this difference? Or is it that institutionalized children differed in other ways from family-reared children (for example, were more sickly as infants, were more poorly nourished, or simply had less intellectual potential) that might explain their poorer outcomes? Without randomly assigning participants to treatments and controlling other factors that may vary across treatments (for example, nutrition received), we simply cannot be certain that social deprivation is the factor responsible for the poor intellectual outcomes that institutionalized children display.

Despite its inability to make precise statements about cause and effect, the natural experiment is useful nonetheless. It can tell us whether a natural event could *possibly* have influenced those who experienced it and thus can provide some meaningful clues about cause and effect.

Table 1.3 summarizes the strengths and limitations of each of the general research designs we have discussed. Before moving on to consider developmental research designs specifically, let's consider one more research strategy used by scientists to verify the generalizability of their theories and hypotheses: the cross-cultural design.

CONCEPT CHECK 1.2 Understanding Research Methods and Designs

Check your understanding of basic research methods used in developmental psychology and research designs by answering the following questions. Answers appear at the end of the chapter.

Multiple Choice: **Select the best answer for each question.**

____ 1. Suppose Dr. Smith is a developmental psychologist who is interested in whether intelligence changes as children develop. She creates a test of intelligence and administers it to a group of children. Her results lead her to conclude that her test actually measured years of schooling, not intelligence. What scientif c ideal did her study violate?
   a. Her measure was not reliable.
   b. Her measure was not valid.
   c. Her experiment did not follow the scientif c method.
   d. Her treatment groups were not randomly assigned.

____ 2. What is the term for the belief that investigators should be objective and use scientif c data to test their theories?
   a. the scientif c attitude
   b the scientif c objective
   c. the scientif c method
   d. the scientif c value

____ 3. If you were to check to make sure that two observers obtained the same results when observing the same event, what would you be measuring?
   a. interrater validity
   b interrater reliability
   c. temporal stability
   d. temporal validity

____ 4. Which of the following methods would be **LEAST** practical to use when studying infants?
   a. naturalistic observation
   b structured observation
   c. psychophysiological methods
   d. the clinical method

Matching: **Match the research method that is best suited for investigating each of the following research questions. Select from the following research methods:**

a. structured interview
b ethnography
c. naturalistic observation
d. structured observation
e. psychophysiological methods

5. _____ Will young elementary school children break a solemn promise to watch a sick puppy when no one is around to detect their transgression?
6. _____ Do 6-year-olds know any negative stereotypes about minority group members?
7. _____ Can 6-month-old infants discriminate the colours red, green, blue, and yellow?
8. _____ Are the aggressive actions that boy playmates display toward each other different from those that occur in girls' play groups?
9. _____ How does life change for boys from the Sambia people once they have experienced tribal rites of puberty?

Short Answer: **Test your knowledge of correlation and causation by brief y answering the following question:**

10. Dr. Chang f nds that the better children feel about themselves (that is, the higher their self-esteem as reported in an interview), the higher their grades are in school. What can we conclude about the relationship between self-esteem and school grades from this study?

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TABLE 1.3 Strengths and Limitations of General Research Designs

Design	Procedure	Strengths	Limitations
Correlational	Gathers information about two or more variables without researcher intervention.	Estimates the strength and direction of relationships among variables in the natural environment.	Does not permit determination of cause and-effect relationships among variables.
Laboratory experiment	Manipulates some aspect of participants' environment (independent variable) and measures its impact on participants' behaviour (dependent variable).	Permits a determination of cause-and effect relationships among variables.	Data obtained in artificial laboratory environment may lack generalizability to the real world.
Field experiment	Manipulates independent variable and measures its impact on the dependent variable in a natural setting.	Permits determination of cause-and-effect relationships and generalization of findings to the real world.	Experimental treatments may be less potent and harder to control when presented in the natural environment.
Natural (quasi-) experiment	Gathers information about the behaviour of people who experience a real-world (natural) manipulation of their environment.	Permits a study of the impact on natural events that would be difficult or impossible to simulate in an experiment; provides strong clues about cause-and-effect relationships.	Lack of precise control over natural events or the participants exposed to them prevents the investigator from establishing definitive cause-and-effect relationships.

Cross-Cultural Designs

Scientists are often hesitant to publish a new finding or conclusion until they have studied enough people to determine that their "discovery" is reliable. However, their conclusions are frequently based on participants living at one point in time within one particular culture or subculture, and it is difficult to know whether these conclusions apply to future generations or even to children currently growing up in other societies or subcultures (Lerner, 1991). Today, the generalizability of findings across samples and settings has become an important issue, because many theorists have implied that there are "universals" in human development—events and outcomes that all children share as they progress from infancy to adulthood.

Cross-cultural studies are those in which participants from different cultural or subcultural backgrounds are observed, tested, and compared on one or more aspects of development. Studies of this kind serve many purposes. For example, they allow the investigator to determine whether conclusions drawn about the development of children from one social context (such as middle-class white children in Canada) also characterize children growing up in other societies or those from different ethnic or socioeconomic backgrounds within the same society (for example, Canadian children of Asian ancestry or those from economically disadvantaged homes). So the **cross-cultural comparison** guards against the overgeneralization of research findings and is the only way to determine whether there are truly "universals" in human development.

cross-cultural comparison
a study that compares the behaviour and/or development of people from different cultural or subcultural backgrounds.

Souza and her colleagues (Souza, Pinheiro, Denardin, Mattos, & Rohde, 2004) used a cross-cultural comparison to examine two groups of children and adolescents who had been diagnosed with attention deficit hyperactivity disorder (ADHD). The groups were from two industrialized cities in Brazil: Pôrto Alegre in the south and Rio de Janeiro in the southeast. Because children and adolescents diagnosed with ADHD in Canada and the United States are typically depressed, defiant, or anxious, the researchers conducting the study wondered whether ethnic and cultural factors might be associated with differences in the kinds of emotional troubles and disorders that accompany ADHD. The results revealed that the patterns of disorders associated with ADHD did not differ between the two geographic regions. Oppositional defiant disorder was the most common co-diagnosis for both regions, and depressive and anxiety disorders occurred among children from the two groups at about the same rates. Results from the Brazilian study were congruent with results from similar studies in the United States and other countries. Therefore, it appears that, among children and adolescents from diverse cultures in developing and industrialized nations, the pattern of emotional disorders accompanying ADHD is quite stable.

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Other investigators who favour the cross-cultural approach are looking for *differences* rather than similarities. They recognize that human beings develop in societies that have very different ideas about issues such as the proper times and procedures for disciplining children, the activities that are most appropriate for boys and for girls, the time at which childhood ends and adulthood begins, the treatment of the aged, and countless other aspects of life (Fry, 1996). They have also learned that people from various cultures differ in the ways they perceive the world, express their emotions, think, and solve problems. So apart from its focus on universals in development, the cross-cultural approach also illustrates that human development is heavily influenced by the cultural context in which it occurs. Evidence of cultural differences is present even in our assumptions of how developmental research should be reported. For example, two Canadian First Nations authors (Johnson & Cremo, 1995) highlighted their concerns about their ability to prepare a chapter for a book because they sensed a fundamental difference in the way First Nations and Western cultures define life. Beliefs of First Nations people support circularity rather than linearity in life. By contrast, Western culture assumes that there is linearity between events (a movement from point A to point B). So apart from its focus on universals in development, the cross-cultural approach also illustrates that human development is heavily influenced by the cultural context in which it occurs.

For example, cross-cultural comparisons have shown us that many of the world's cultures have no concept of adolescence as a distinct phase of life. The St. Lawrence Island Inuit people, for example, simply distinguish boys from men and girls from

1.1 CULTURAL INFLUENCES

A Cross-Cultural Comparison of Gender Roles

Jeffrey Aaronson/Still Media

The roles assumed by men and women may vary dramatically from culture to culture.

One of the greatest values of cross-cultural comparisons is that they can tell us whether a developmental phenomenon is or is not universal. Consider the roles that males and females play in our society. In our culture, playing the masculine role has traditionally required traits such as independence, assertiveness, and dominance. Females are expected to be more nurturing and sensitive to other people. Are these masculine and feminine roles universal? Could biological differences between the sexes lead inevitably to sex differences in behaviour?

Many years ago, anthropologist Margaret Mead (1935) compared the gender roles adopted by people in three tribal societies on the island of New Guinea, and her observations are certainly thought provoking. In the Arapesh tribe, both men and women were taught to play what we would regard as a feminine role: They were cooperative, nonaggressive, and sensitive to the needs of others. Both men and women of the Mundugumor tribe were brought up to be aggressive and emotionally unresponsive to other people—a masculine pattern of behaviour by Western standards. Finally, the Tchambuli displayed a pattern of gender-role development that was the direct opposite of the Western pattern: Males were passive, emotionally dependent, and socially sensitive, whereas females were dominant, independent, and assertive.

Mead's cross-cultural comparison suggests that cultural learning may have far more to do with the characteristic behaviour patterns of men and women than biological differences do. So we very much need cross-cultural comparisons such as Mead's. Without them, we might easily make the mistake of assuming that whatever holds true in our society holds true everywhere; with their help, we can begin to understand the contributions of biology and environment to human development.

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women, following the belief of many preliterate societies that passage to adulthood occurs at puberty (Keith, 1985). Yet other cultures' depictions of the life span are much more intricate than our own. The Arasha of East Africa, for example, have at least six meaningful age strata for males: youths, junior warriors, senior warriors, junior elders, senior elders, and retired elders.

The fact that age does not have the same meaning in all eras or cultures reflects a basic truth that we have already touched on and will emphasize repeatedly throughout this book: The course of human development in one historical or cultural context is apt to differ, and to differ substantially, from that observed in other eras and cultural settings (Fry, 1996). Aside from our biological link to the human race, we are largely products of the times and places we live in. (See the box on page 26 for a dramatic illustration of cultural diversity in gender roles.)

It is important to note that cross-cultural comparisons do not always examine similarities and differences among people of different nationalities but that this method is also used to compare cultural differences within a specific nation. For example, many studies examine differences among subcultures within Canada because the experiences that these subcultures have can be quite different. These studies add to our understanding of how environmental and societal factors can influence development. But to truly understand how developmental change occurs, we need to use research methods designed to illuminate those changes. This is the topic of our next section.

Research Strategies and Studying Development

In the previous sections, we considered data collection methods and research designs that could be used in many areas of psychological research. The designs we considered were helpful for identifying relationships between variables (the correlational design), for detecting causal relationships between variables (the various experimental designs), and for evaluating the generalizability of our theories (the cross-cultural comparisons). In the next sections, we will consider additional research designs that can be combined with the ones we've already considered to give us information about *developmental* continuities and changes. These are designs that allow us to make inferences about how people change over time.

Research Designs for Studying Development

Developmentalists are not merely interested in examining people's progress at one particular phase of life; instead, they hope to determine how people's feelings, thoughts, abilities, and behaviours *develop* or *change* over time. Four basic approaches allow us to chart these developmental trends: the cross-sectional design, the longitudinal design, the sequential design, and the microgenetic design.

The Cross-Sectional Design

cross-sectional design
a research design in which subjects from different age groups are studied at the same point in time.

cohort
a group of people of the same age who are exposed to similar cultural environments and historical events as they are growing up.

In a **cross-sectional design**, people who *differ in age* are studied at *the same point in time*. In cross-sectional research, participants at each age level are *different* people. That is, they come from different cohorts, where a **cohort** is defined as a group of people of the same age who are exposed to similar cultural environments and historical events as they are growing up. By comparing participants in the different age groups, investigators can often identify age-related changes in whatever aspect of development they happen to be studying.

An experiment by Brian Coates and Willard Hartup (1969) is an excellent example of a cross-sectional experimental design. Coates and Hartup were interested in determining why preschool children are less proficient than Grade 1 or 2 children at learning new responses displayed by an adult model. Their hypothesis was that younger children do not spontaneously *describe* what they are observing, whereas older children produce

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verbal descriptions of the modelled sequence. When asked to perform the actions they have witnessed, the preschoolers are at a distinct disadvantage because they have no verbal "learning aids" that would help them to recall the model's behaviour.

To test these hypotheses, Coates and Hartup designed an interesting cross-sectional experiment. Children from two age groups—4- to 5-year-olds and 7- to 8-year-olds—watched a short film in which an adult model displayed 20 novel responses, such as throwing a beanbag between his legs, lassoing an inflatable toy with a Hula-Hoop, and so on. Some of the children from each age group were instructed to describe the model's actions, and they did so as they watched the film (induced-verbalization condition). Other children were not required to describe the model's actions as they observed them (passive-observation condition). When the show ended, each child was taken to a room that contained the same toys seen in the film and was asked to demonstrate what the model had done with these toys.

Figure 1.5 illustrates three interesting findings that emerged from this experiment. First, the 4- to 5-year-olds who were *not* told to describe what they had seen (that is, the passive observers) reproduced *fewer* of the model's responses than the 4- to 5-year-olds who described the model's behaviour (the induced verbalizers) or the 7- to 8-year-olds in either experimental condition. This finding suggests that 4- to 5-year-old children may not produce the verbal descriptions that would help them learn unless they are explicitly instructed to do so. Second, the performance of younger and older children in the induced-verbalization condition was comparable. So younger children can learn just as much as older children by observing a social model *if the younger children are told to describe what they are observing*. Finally, 7- to 8-year-olds in the passive-observation condition reproduced about the same number of behaviours as 7- to 8-year-olds in the induced-verbalization condition. This finding suggests that instructions to describe the model's actions had little effect on 7- to 8-year-olds, who apparently describe what they have seen even when not told to so. Taken together, the results imply that 4- to 5-year-olds may often learn less from social models because they, unlike older children, do not spontaneously produce the verbal descriptions that would help them remember what they have observed.

An important advantage of the cross-sectional design is that the investigator can collect data from children of different ages over a short time. For example, Coates and Hartup did not have to wait three years for their 4- to 5-year-olds to become 7- to 8-year-olds to test their developmental hypotheses. They merely sampled from two age groups and tested both samples simultaneously. Yet there are two important limitations of cross-sectional research.

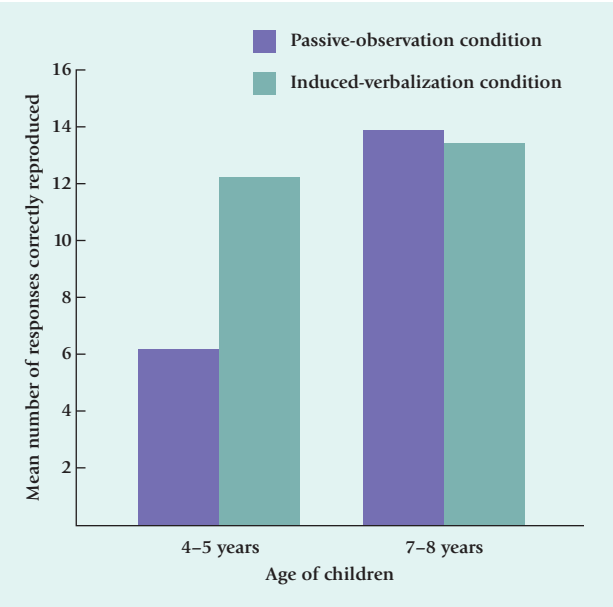

Figure 1.5 Children's ability to reproduce the behaviour of a social model as a function of age and verbalization instructions. *Adapted from "Age and Verbalization in Observational Learning," by B. Coates and W.W. Hartup, 1969,* Developmental Psychology, 1, *pp. 556-62. Copyright © 1969 by the American Psychological Association. Adapted with permission.*

Cohort Effects. Recall as we noted above that in cross-sectional research, participants at each age level are *different* people. That is, they come from different cohorts. The fact that cross-sectional comparisons always involve different cohorts presents us with a thorny interpretive problem—any age differences that are found in the study may not always be due to age or development but, rather, may reflect other cultural or historical factors that distinguish members of different cohorts. Stated another way, cross-sectional comparisons *confound age and cohort effects*.

An example should clarify the issue. For years, cross-sectional research had consistently indicated that young adults score slightly higher on intelligence tests than middle-aged adults, who, in turn, score much higher than the elderly. But does intelligence decline with age, as these findings would seem to indicate? Not necessarily. Later research (Schaie, 1990) revealed that individuals' intelligence test scores remain relatively stable over the years and that the earlier studies were really measuring something quite different: age differences in education. The older adults in the cross-sectional studies had

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less schooling and, therefore, scored lower on intelligence tests than the middle-aged and young adult samples. Their test scores had not declined but, rather, had always been lower than those of the younger adults with whom they were compared. So the earlier cross-sectional research had discovered a **cohort effect**, not a true developmental change.

cohort effect
age-related difference among cohorts that is attributable to cultural/historical differences in cohorts' growing-up experiences rather than to true developmental change.

Despite this important limitation, the cross-sectional comparison is still the design that developmentalists use most often. Why? Because it has the advantage of being quick and easy; we can go out this year, sample individuals of different ages, and be done with it. Moreover, this design is likely to yield valid conclusions when there is little reason to believe that the cohorts being studied have had widely different experiences while growing up. So if we compared 4- to 5-year-olds with 7- to 8-year-olds, as Coates and Hartup did, we might feel reasonably confident that history or the prevailing culture had not changed in any major way in the three years that separate these two cohorts. It is mainly in studies that attempt to make inferences about development over a span of many years that cohort effects present a serious problem.

Data on Individual Development. There is a second noteworthy limitation of the cross-sectional design: It tells us nothing about the development of *individuals* because each person is observed *at only one point in time*. So cross-sectional comparisons cannot provide answers to questions such as "When will this particular child become more independent?" or "Will this aggressive 2-year-old become an aggressive 5-year-old?" To address issues like these, investigators often turn to a second kind of developmental comparison, the longitudinal design.

The Longitudinal Design

longitudinal design
a research design in which one group of subjects is studied repeatedly over a period of months or years.

In a **longitudinal design**, the same participants are observed repeatedly over a period of time. The period may be relatively brief—six months to a year—or it may be very long, spanning a lifetime. Researchers may be studying one particular aspect of development, such as intelligence, or many. By repeatedly testing the same participants, investigators can assess the *stability* (continuity) of various attributes for each person in the sample. They can also identify normative developmental trends and processes by looking for commonalities, such as the point(s) at which most children undergo various changes and the experiences, if any, that children seem to share prior to reaching these milestones. Finally, tracking several participants over time will help investigators to understand *individual differences* in development, particularly if they are able to establish that different kinds of earlier experiences lead to very different outcomes.

Several very noteworthy longitudinal projects have followed children for decades and have assessed many aspects of development (for example, Kagan & Moss, 1962; Newman, Caspi, Moffitt, & Silva, 1997). A Canadian group of researchers from Montreal have conducted a 21-year longitudinal study of over 1000 males (see Booij et al., 2010). However, most longitudinal studies are much more modest in direction and scope. For example, Carolee Howes and Catherine Matheson (1992) conducted a study in which the pretend play activities of a group of 1- to 2-year-olds were repeatedly observed at six-month intervals over three years. Using a classification scheme that assessed the cognitive complexity of play, Howes and Matheson sought to determine (1) whether play did reliably become more complex with age, (2) whether children reliably differed in the complexity of their play, and (3) whether the complexity of a child's play reliably forecast his or her social competencies with peers. Not surprisingly, all children displayed increases in the complexity of their play over the three-year period, although there were reliable individual differences in play complexity at each observation point. In addition, there was a clear relationship between the complexity of a child's play and later social competence with peers: Children who engaged in more complex forms of play at any given age were the ones who were rated as most outgoing and least aggressive at the next observation period six months later. So this longitudinal study shows that complexity of pretend play not only increases with age but also is a reliable predictor of children's future social competencies with peers.

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practice effects
changes in participants' natural responses as a result of repeated testing.

selective attrition
nonrandom loss of participants during a study that results in a nonrepresentative sample.

Although we have portrayed the longitudinal design in a very favourable manner, this approach has several potential drawbacks as well. For example, longitudinal projects can be costly and *time consuming*. These points are especially important in that the focus of theory and research in the developmental sciences is constantly changing and longitudinal questions that seem exciting at the beginning of a 10- or 20-year project may seem rather trivial by the time the project ends. **Practice effects** can also threaten the validity of longitudinal studies: Participants who are repeatedly interviewed or tested may become test-wise or increasingly familiar with the content of the test itself, showing performance improvements that are unrelated to normal patterns of development. Longitudinal researchers may also have a problem with **selective attrition**; children may move away or become bored with participating, or they may have parents who, for one reason or another, will not allow them to continue in the study. The end result is a smaller and potentially **nonrepresentative sample** that not only provides less information about the developmental issues in question but also may limit the conclusions of the study to those children who do not move away and who remain cooperative over the long run.

Harood M. Lambert/Hulton Archive/Getty Images

Andrew Olney/Photographer's Choice/Getty Images

Leisure activities of the 1930s (top) and today (bottom). As these photos illustrate, the kinds of experiences that children growing up in the 1930s had were very different from those of today's youth. Many believe that cross-generational changes in the environment may limit the results of a longitudinal study to the children who were growing up while the research was in progress.

There is another shortcoming of long-term longitudinal studies that students often see right away—the **cross-generational problem**. Children in a longitudinal project are typically drawn from one cohort and are likely to have very different kinds of experiences than children from other eras. Consider, for example, how the times have changed since the 1930s and 1940s, when children in some of the early long-term longitudinal studies were growing up. Today, in this age of dual-career families, more children are attending daycare centres and nursery schools than ever before. Modern families are smaller than the past, meaning that children now have fewer brothers and sisters. Families also move more frequently than they did in the 1930s and 1940s, so many children from the modern era are exposed to a wider variety of people and places than was typical in the past. And no matter where they may be living, today's children grow up in front of televisions, video games, and computers—influences that were not available during the 1930s and 1940s. So children of earlier eras lived in a very different world, and we cannot be certain that those children developed in precisely the same way as today's children. In sum, cross-generational changes in the environment may limit the conclusions of a longitudinal project to those participants who were growing up while the study was in progress.

We have seen that the cross-sectional and the longitudinal designs each have distinct advantages and disadvantages. Might it be possible to combine the best features of both approaches? A third kind of developmental comparison—the sequential design—tries to do just that.

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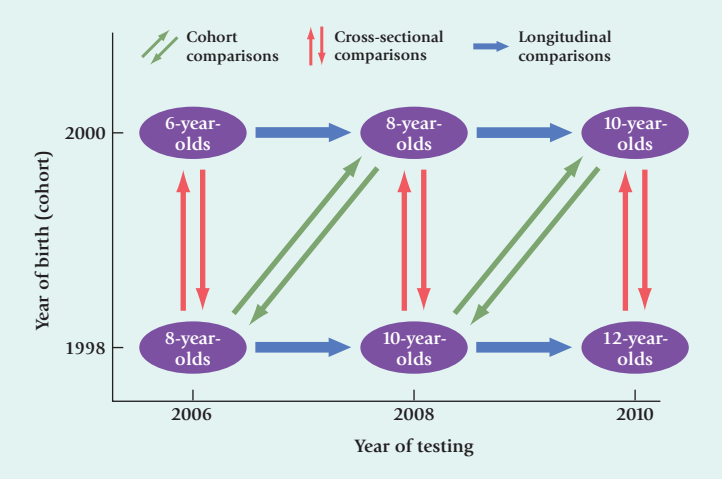

Figure 1.6 Example of a sequential design. Two samples of children, one born in 1998 and one born in 2000, are observed longitudinally between the ages of 6 and 12. The design permits the investigator to assess cohort effects by comparing children of the same age who were born in different years. In the absence of cohort effects, the longitudinal and cross-sectional comparisons in this design also permit the researcher to make strong statements about the strength and direction of any developmental changes.

The Sequential Design

Sequential designs combine the best features of cross-sectional and longitudinal studies by selecting participants of different ages and following each of these cohorts over time. To illustrate, imagine that we wished to study the development of children's logical reasoning abilities between the ages of 6 and 12. We might begin in 2012 by testing the logical reasoning of a sample of 6-year-olds (the 2006 birth cohort) and a sample of 8-year-olds (the 2004 birth cohort). We could then retest the reasoning abilities of both groups in 2014 and 2016. Notice that the design calls for us to follow the 2006 cohort from ages 6 through 10 and the 2004 cohort from ages 8 through 12. A graphic representation of this research plan appears in **Figure 1.6**.

A major Canadian sequential study, called the National Longitudinal Survey of Children and Youth (NLSCY), has been collecting data on approximately 20 000 children since 1994. An initial cohort of about 15 000 children, aged 0–11 in 1994, is being followed every two years to age 25. Younger children are being added to the sample as the initial cohort ages. This younger cohort, which will eventually number over 20 000 children, will be followed through the transition into elementary school (Statistics Canada, 2003c). This survey is a joint project funded through Human Resources Development Canada and Statistics Canada.

nonrepresentative sample
a subgroup that differs in important ways from the larger group (or population) to which it belongs.

cross-generational problem
the fact that long-term changes in the environment may limit the conclusions of a longitudinal project to that generation of children who were growing up while the study was in progress.

sequential design
a research design in which subjects from different age groups are studied repeatedly over a period of months or years.

There are three major strengths of this sequential design. First, it allows us to determine whether cohort effects are influencing our results by comparing the logical reasoning of same-aged children who were born in different years. As shown in the figure, cohort effects are assessed by comparing the logical reasoning of the two samples when each is aged 8 and 10. If the samples do not differ, we can assume that cohort effects are not operating. **Figure 1.6** also illustrates a second major advantage of our sequential design: It allows us to make both longitudinal and cross-sectional comparisons in the same study. If the age trends in logical reasoning are similar in both the longitudinal and the cross-sectional comparisons, we can be quite confident that they represent true developmental changes in logical reasoning abilities. Finally, sequential designs are often more efficient than standard longitudinal designs. In our example, we could trace the development of logical reasoning over a six-year age range, even though our study would take only four years to conduct. A standard longitudinal comparison that initially sampled 6-year-old participants would take six years to provide similar information. Clearly, this combination of the cross-sectional and longitudinal designs is a rather versatile alternative to either of these approaches.

The Microgenetic Design

Cross-sectional, longitudinal, and sequential designs provide only a broad outline of developmental changes without necessarily specifying why or how these changes take place. **Microgenetic designs**, currently favoured by many researchers who study children's cognitive development, are used in an attempt to illuminate the processes that are thought to promote developmental changes. The logic is straightforward: Children who are thought to be ready for an important developmental change are exposed repeatedly to experiences that are thought to produce the change and their behaviour is monitored *as it is changing*.

microgenetic design
a research design in which participants are studied intensively over a short period of time as developmental changes occur; attempts to specify how or why those changes occur.

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WHAT DO YOU THINK? ?

Suppose you hoped to study the effects of famine on developing children. What research methods and designs would you choose to conduct your study?

Cognitive theorists have used this approach to specify how children come to rely on new and more efficient strategies for solving problems. By studying participants intensively over a period of hours, days, or weeks and carefully analyzing their problem-solving behaviour, it is often possible to specify how their thinking and strategizing are changing to advance their cognitive competencies (Siegler & Svetina, 2002), arithmetic skills (Siegler & Jenkins, 1989), memory (Coyle & Bjorklund, 1997), and language skills (Gershkoff-Stowe & Smith, 1997). Although the microgenetic approach is a new method, it holds great promise for illuminating the kinds of experiences that can promote changes in such areas of social and personality development as self-concept and self-esteem, social cognition (that is, understanding others' behaviours and forming impressions of others), reasoning about moral issues, and thinking about gender-role stereotypes, to name a few.

A clever example of a study that used the microgenetic approach was conducted by Mary Courage from Memorial University and her colleagues (Courage, Edeson, & Howe, 2005). They combined microgenetic and cross-sectional approaches in their study of the development of visual self-recognition in infants. In the microgenetic component of the study, each of 10 toddlers was assessed biweekly between the ages of 15 and 23 months. In the cross-sectional component, 10 toddlers were assessed in each of nine age groups, the youngest consisting of 15-month-olds, the next 16-month-olds, and so on through 23 months. All children in the study were assessed using three visual tasks. In the first task, each child's parent surreptitiously marked the infant's nose with blue paint. Thirty seconds later, a mirror was placed in front of the child. Upon seeing themselves in the mirror, children who touched hand to nose, or commented about appearance change, were designated "recognizers." Children who stared at the image, or looked shy or embarrassed, were designated as "ambiguous," and children who did not respond with either recognizer or ambiguous behaviours were designated "non-recognizers." A second task required the children to identify a photograph of her- or himself that was presented with two other Polaroid pictures of children of the same age and sex. During the third task, the experimenters suspended a toy behind each infant's head so that the infant could see the toy in a mirror. Infants were considered successful when they turned to locate the toy in real space.

The microgenetic data revealed that prior to mastery of the visual recognition task, children experienced a period during which they successfully identified themselves at some times and failed to identify themselves at others. As well, this ambiguous period was short for some children, being observed during only a single session, and much longer, lasting four sessions, for other children. The cross-sectional data told another story. Month-to-month changes in self-recognition represented by the successive age groups appeared to be more abrupt. A sharp increase in self-recognition ability that occurred between 16 months and 17 months in the cross-sectional data was not apparent in the microgenetic data. However, the mean age of mirror self-recognition fell within the 16-month to 17-month range for the 10 infants who participated in the microgenetic component of the study, suggesting some convergence of results between the two approaches. The average age of success for the photo identification and toy location tasks was younger in the microgenetic component than in the cross-sectional component.

Although microgenetic techniques present a unique opportunity to witness and record the actual process of change as it occurs during development, there are disadvantages to the microgenetic approach. First, it is difficult, time consuming, and costly to track large numbers of children in such a detailed manner. Recall that Courage and colleagues recorded the progress of only 10 toddlers in the microgenetic component of their study, whereas they included 90 toddlers in the cross-sectional component. Also, the frequency of observations required by the microgenetic method may affect the developmental outcomes of the children involved. Courage's research group notes that among the microgenetically assessed infants in their study, the lower mean age of successful achievement for both the photo identification and toy location tasks may have been due to practice effects. During the course of the study, these toddlers experienced each of the two tasks twice a week for 32 weeks, for a total of 64 trials, whereas youngsters in the cross-sectional study experienced the task only once. Practice effects in microgenetic

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research may be minimized by employing more naturalistic observational techniques, but caution is warranted when drawing conclusions about behaviours that are elicited repeatedly in a laboratory setting.

So criticisms of the microgenetic approach include that the intensive experiences children receive to stimulate development may not reflect what they would normally encounter in the real world and may produce changes in their behaviour that may not persist over the long run. Thus, researchers typically use the microgenetic design to investigate age-related changes in thinking or behaviour that are already known to occur. Their purpose is to specify more precisely *how* or *why* these changes might occur by studying children as the changes take place.

To help you review and compare the four major developmental designs, **Table 1.4** provides a brief description of each, along with its major strengths and weaknesses.

Isn't it remarkable how many methods and designs developmentalists have at their disposal? This diversity of available procedures is a definite strength because findings gained through one procedure can then be checked and perhaps confirmed through other procedures. Indeed, providing such *converging evidence* serves a most important function by demonstrating that the conclusion a researcher draws is truly a "discovery" and not merely an artifact of the method or design used to collect the original data. So there is no "best method" for studying children and adolescents; each of the approaches we have considered has contributed substantially to our understanding of human development.

Ethical Considerations in Developmental Research

When designing and conducting research with humans, researchers may face thorny issues centring on *research ethics*—the standards of conduct that investigators are ethically bound to honour to protect their research participants from physical or psychological

TABLE 1.4 Strengths and Limitations of Four Developmental Designs

Design	Procedure	Strengths	Limitations
Cross-sectional	Observes people of different ages (or cohorts) at one point in time.	Demonstrates age differences; hints at developmental trends; relatively inexpensive; takes little time to conduct.	Age trends may reflect extraneous differences between cohorts rather than true developmental change; provides no data on the development of individuals because each participant is observed at only one point in time.
Longitudinal	Observes people of one cohort repeatedly over time.	Provides data on the development of individuals; can reveal links between early experiences and later outcomes; indicates how individuals are alike and how they are different in the ways they change over time.	Relatively time consuming and expensive; selective attrition may yield nonrepresentative sample that limits the generalizability of conclusions; cross-generational changes may limit one's conclusions to the cohort that was studied.
Sequential	Combines the cross-sectional and the longitudinal approaches by observing different cohorts repeatedly over time.	Discriminates true developmental trends from cohort effects; indicates whether developmental changes experienced by one cohort are similar to those experienced by other cohorts; often less costly and time consuming than the longitudinal approach.	More costly and time consuming than cross-sectional research; despite being the strongest design, may still leave questions about whether a developmental change is generalizable beyond the cohorts studied.
Microgenetic	Children are observed extensively over a limited time period when a developmental change is thought to occur.	Extensive observation of changes as they occur can reveal how and why changes occur.	Extensive experience given to stimulate change may be somewhat atypical and produce changes that may not persist over long periods.

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harm. Some ethical issues are easily resolved: One simply does *not* conduct experiments that will cause physical or psychological damage, such as physical abuse, starvation, isolation for long periods, and the like. However, most ethical issues are far more subtle. Here are some of the dilemmas that developmentalists may have to resolve during their careers as researchers:

- Can children or adolescents be exposed to temptations that virtually guarantee that they will cheat or break other rules?
- Am I ever justified in deceiving participants, either by misinforming them about the purpose of my study or by telling them something untrue about themselves (for example, "You did poorly on this test," when they actually did very well)?
- Can I observe my participants in the natural setting without informing them that they are the subjects of a scientific investigation?
- Is it acceptable to tell children that their classmates think that an obviously incorrect answer is "correct" to see whether participants will conform to the judgments of their peers?
- Am I justified in using verbal disapproval as part of my research procedure?

Before reading further, you may want to think about these issues and formulate your own opinions. Then read **Table 1.5** on page 36 and reconsider your viewpoints.

Have any of your opinions changed? As you can see, the table guidelines are very general; they do not explicitly permit or prohibit specific operations or practices such as those described in the preceding dilemmas. In fact, any of the listed dilemmas can be resolved in ways that permit an investigator to use the procedures in question and still remain well within current ethical guidelines. For example, it is generally considered permissible to observe young children in natural settings (for example, at school or in a park) without informing them that they are being studied if the investigator has previously obtained the **informed consent** (see **Table 1.5**) of the adults responsible for the children's care and safety in these settings. Ethical guidelines are just that: guidelines. The ultimate responsibility for treating children fairly and protecting them from harm is the investigator's.

informed consent
the right of research participants to receive an explanation, in language they can understand, of all aspects of research that may affect their willingness to participate.

How, then, do investigators decide whether to use a procedure that some may consider questionable on ethical grounds? They generally weigh the advantages and disadvantages of the research by carefully calculating its possible *benefits* (to humanity or to the participants) and comparing them with the potential *risks* that participants may face (Grieg & Taylor, 2004). If the **benefits-to-risks ratio** is favourable, and if there are no other less risky procedures that could be used to produce these same benefits, the investigator will generally proceed. However, there are safeguards against overzealous researchers who underestimate the riskiness of their procedures. In Canada, for example, universities, research foundations, and government agencies that fund research with children have set up "human-participant review committees" to provide second (and sometimes third) opinions on the ethical ramifications of all proposed research. The function of these review committees is to reconsider the potential risks and benefits of the proposed research and, more importantly, to help ensure that all possible steps are taken to protect the welfare of those who may choose to participate in the project.

benefits-to-risks ratio
a comparison of the possible benef ts of a study for advancing knowledge and optimizing life conditions versus its costs to participants in terms of inconvenience and possible harm.

Clashes between the ethical provisions of **confidentiality** and **protection from harm** can pose serious ethical dilemmas for researchers who learn that the well-being of one or more participants or their associates may be seriously at risk of such life-threatening events as suicidal tendencies and untreated sexually transmitted diseases. These are risks that many investigators may feel ethically bound to report or to help the participant to self-report to the appropriate medical, social, or psychological services. Indeed, adolescents view reporting of these very serious risks (or, alternatively, helping the participant to self-report) in a very favourable way, and they may perceive inaction on the investigator's part as an indication that the problem is considered unimportant, that no services are available to assist them, or that knowledgeable adults cannot be

confidentiality
the right of participants to concealment of their identity with respect to the data that they provide.

protection from harm
the right of research participants to be protected from physical or psychological harm.

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CONCEPT CHECK 1.3 Understanding Developmental Research Designs

Check your understanding of developmental research designs by answering the following questions. Answers appear at the end of the chapter.

Multiple Choice: **Select the best answer for each question.**

_____ 1. Which of the following is a disadvantage of the longitudinal research design?
   a. It does not evaluate individual differences in development.
   b. It is subject to the cross-generational problem.
   c. It violates the scientif c method.
   d. It may cause developmental delays and trauma to the participants.

_____ 2. Which of the following is a disadvantage of the cross-sectional research design?
   a. It does not evaluate individual differences in development.
   b. It is subject to the cross-gender problem.
   c. It violates the scientif c method.
   d. It may cause developmental changes that would not occur naturally and which may not be long-lasting.

_____ 3. Which of the following is a disadvantage of the microgenetic research design?
   a. It does not evaluate individual differences in development.
   b. It confounds cohort and age effects.
   c. It violates the scientif c method.
   d. It may cause developmental changes that would not occur naturally and which may not be long-lasting.

Fill in the Blank: **Complete the following sentences with the appropriate word or phrase.**

4. One primary problem with longitudinal designs is that participants may drop out of the study before it is concluded. This is called _____.

5. A group of children who are the same age and develop in the same cultural and historical times is called a _____.

6. Making sure that any research conducted with children causes no harm and passes the benef ts-to-risk ratio test is ultimately the responsibility of _____.

Matching: **Match the following developmental research designs to the appropriate research questions. Choose from the following designs:**

a. cross-sectional design
b longitudinal design
c. sequential design
d. microgenetic design

7. _____ A developmentalist hopes to determine whether all children go through the same stages of intellectual development between infancy and adolescence.

8. _____ A developmentalist wants to quickly assess whether 4-, 6-, and 8-year-old children differ in their willingness to donate part of their allowance to children less fortunate than themselves.

9. _____ A developmentalist wants to determine how and why Grade 3 children acquire memory strategies.

Short Answer: **Brief y answer the following question.**

10. Suppose you are a developmental psychologist and you are interested in learning about how elementary school children in Grades 1 through 5 change in their altruistic behaviour (that is, their willingness to help others who are in need).
   a. Design a cross-sectional study to answer the research question.
   b. Design a longitudinal study to answer the research question.

depended upon to help adolescents in need. (See Fisher, Higgins-D'Alesandro, Rau, Kuther, & Belanger, 1996, for an excellent discussion of the confidentiality dilemmas researchers may face and adolescents' views about appropriate courses of action for researchers to take.)

Of course, final approval of safeguards and reporting procedures by a review committee does not absolve investigators of the need to reevaluate the benefits and costs of their projects, even while the research is in progress (Thompson, 1990). Suppose, for example, that a researcher studying children's aggression in a playground setting came to the conclusion that his subjects had (1) discovered his own fascination with aggressive behaviour and (2) begun to beat on one another to attract his attention. At that point, the risks to participants would have escalated far beyond the researcher's initial estimates and he would be ethically bound (in our opinion) to stop the research immediately.

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TABLE 1.5 Major Rights of Children and Responsibilities of Investigators Involved in Psychological Research

Ethical considerations are especially complex when children participate in psychological research. Children are more vulnerable than adolescents and adults to physical and psychological harm. Moreover, young children may not always fully understand what they are committing themselves to when they agree to participate in a study. To protect children who participate in psychological research and to clarify the responsibilities of researchers who work with children, the Canadian Psychological Association (2000), the American Psychological Association (1992), and the Society for Research in Child Development (1993) have endorsed special ethical guidelines, the more important of which are as follows:

*Protection from Harm**

The investigator may use no research operation that may harm the child either physically or psychologically. Psychological harm is difficult to define; nevertheless, its definition remains the responsibility of the investigator. When an investigator is in doubt about the possible harmful effects of the research operations, he or she must seek consultation from others. When harm seems possible, he or she is obligated to find other means of obtaining the information or abandon the research.

Informed Consent

The informed consent of parents, as well as others who act in the child's behalf—teachers, superintendents of institutions—should be obtained, preferably in writing. Informed consent requires that the parent or other responsible adult be told all features of the research that may affect his or her willingness to allow the child to participate. Moreover, all children have the right to have explained to them, in understandable language, all aspects of the research that could affect their willingness to participate. Of course, children always have the right to choose not to participate or to discontinue participation in research at any time. This provision is a tricky one, however: Even if they are told that they can stop participating in a study at any time, young children may not really grasp how to do so or may not really believe that they can stop without incurring a penalty of some kind. However, children are much more likely to understand their rights of assent and to exercise them if the researcher carefully explains that he or she would not be upset if the child chose not to participate or to stop participating (Abramovitch, Freedman, Henry, & Von Brunschot, 1995).

Confidentiality

Researchers must keep in confidence all information obtained from research participants. Children have the right to concealment of their identity on all data collected and reported, either in writing or informally. The one exception is that provinces have laws that require investigators to reveal the names of suspected victims of child abuse or neglect to provincial authorities (either police or agencies overseeing the protection of children). These laws are found under statutes governing child welfare—for example, Ontario's *Child and Family Services Act* (1990, section 72(2)).

Deception, Debriefing, and Knowledge of Results

Although children have the right to know the purposes of a study in advance, a particular project may necessitate concealment of information, or deception. Whenever concealment or deception is thought to be essential to the conduct of research, the investigator must satisfy a committee of peers that this judgment is correct. If deception or concealment is used, participants must later be debriefed—that is, told, in language they can understand, the true purpose of the study and why it was necessary to deceive them. Children also have the right to be informed, in language they can understand, of the results of the research in which they have participated.

*Ross Thompson (1990) has published an excellent essay on this topic. We recommend it to anyone who conducts or plans to conduct research with children.

Postscript: On Becoming a Wise Consumer of Developmental Research

At this point, you may be wondering, "Why do I need to know so much about the methods that developmentalists use to conduct research?" This is a reasonable question, given that the vast majority of students who take this course will pursue other careers and will never conduct a scientific study of developing children or adolescents.

Our answer is straightforward: Although survey courses such as this one are designed to provide a solid overview of theory and research in the discipline to which they pertain, they should also strive to help you evaluate the relevant information you may encounter in the years ahead. And you will encounter such information. Even if you don't read academic journals in your role as a teacher, school administrator, nurse, probation officer, social worker, or other professional who works with developing persons, then certainly you will be exposed to such information through the popular media—television, newspapers, magazines, and the like. How can you know whether that seemingly dramatic and important new finding you've just read or heard about should be taken seriously?

This is an important issue, for new information about human development is often chronicled in the popular media several months or even years before the data on which the media reports are based finally make their appearance in professional journals. What's more, less than 30 percent of the findings that developmentalists submit are judged worthy of publication by reputable journals in our discipline. So many media reports of "dramatic" new findings are based on research that other scientists do not regard as very dramatic, or even worth publishing.

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Even if a media report is based on a published article, coverage of the research and its conclusions is often misleading. For example, one TV news story reported on a published article, saying that there was clear evidence that "alcoholism is inherited." As we will see in Chapter 3, this is a far more dramatic conclusion than the authors actually drew. Another metropolitan newspaper report summarized a recent article from the prestigious journal *Developmental Psychology* with the headline "Day Care Harmful for Children." What was never made clear in the newspaper article was the researcher's (Howes, 1990) conclusion that *very low-quality* daycare may be harmful to the social and intellectual development of *some* preschool children but that most youngsters receiving good daycare suffer no adverse effects.

We don't mean to imply that you can never trust what you read; rather, we'd caution you to be skeptical and to evaluate media (and journal) reports, using the methodological information presented in this chapter. You might start by asking: How were the data gathered, and how was the study designed? Were appropriate conclusions drawn given the limitations of the method of data collection and the design (correlational versus experimental; cross-sectional versus longitudinal) that the investigators used? Was there random assignment to treatment groups? Have the results of the study been reviewed by other experts in the field and published in a reputable academic journal? And please don't assume that published articles are beyond criticism. Many theses and dissertations in the developmental sciences are based on problems and shortcomings that students have identified in previously published research. So take the time to read and evaluate published reports that seem especially relevant to your profession or to your role as a parent. You will have a better understanding of the research and its conclusions, but any lingering questions and doubts you may have can often be addressed through a letter, an email, or a phone call to the author of the article.

So we encourage you to become a knowledgeable consumer in order to get the most out of what the field of human development has to offer. Our discussion of research methodology was undertaken with these objectives in mind, and a solid understanding of these methodological lessons should help you to properly evaluate the research you will encounter, not only throughout this text but also in many other sources in the years to come.

NELSON Draft

SUMMARY

- Development refers to the systematic continuities and changes that people display over the course of their lives that reflect the influence of biological maturation and learning.
- Developmentalists come from many disciplines, and all study the process of development.
- Developmental psychology is the largest of these disciplines.
- Normative developments are typical developments characterizing all members of a species; ideographic developments describe those that may vary across individuals.
- Developmentalists' goals are to describe, explain, and optimize development.
- Human development is a continual and cumulative process that is holistic, highly plastic, and heavily influenced by the historical and cultural contexts in which it occurs.

Human Development in Historical Perspective

- In medieval times, children were afforded few of the rights and protections of today's youth.
- The 17th- and 18th-century philosophies of original sin, innate purity, and tabula rasa contributed to a more humane outlook on children.
- In the 19th century, scientists began to record the development of their infant sons and daughters in baby biographies.
- The scientific study of development did not emerge until the early 1900s, when G. Stanley Hall began to collect data and formulate theories about human development.
- Soon, other researchers were deriving hypotheses and conducting research to evaluate and extend early theories.

Research Strategies: Basic Methods and Designs

- The scientific method is a value system that requires the use of objective data to determine the viability of theories. Theories are sets of concepts and propositions designed to organize, describe, and explain an existing set of observations. Theories generate hypotheses, or predictions about future phenomena. The scientific method sifts through data to determine whether theories should be kept, refined, or abandoned.
- Acceptable research methods possess both reliability (produce consistent, replicable results) and validity (accurately measure what they are intended to measure).
- The most common methods of data collection in child and adolescent development are
  - Self-reports (questionnaires and interviews)
  - The clinical method (a more flexible interview method)

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- Observational methodologies (naturalistic and structured observations)
- Case studies
- Ethnography
- Psychophysiological methods

Detecting Relationships: Correlational, Experimental, and Cross-Cultural Designs

- Correlational designs examine relationships as they naturally occur, without any intervention.
- The correlation coefficient is used to estimate the strength and magnitude of the association between variables.
- Correlational studies cannot specify whether correlated variables are causally related.
- The experimental design identifies cause-and-effect relationships. The experimenter
  - Manipulates one (or more) independent variables
  - Exercises experimental control over all other confounding variables (often by random assignment of participants to treatments)
  - Observes the effect(s) of the manipulation(s) on the dependent variable
- Experiments may be performed in the laboratory or in the natural environment (that is, a field experiment), thereby increasing the ecological validity of the results.
- The impact of events that researchers cannot manipulate or control can be studied in natural (quasi-) experiments. However, lack of control over natural events prevents the quasi-experimenter from drawing definitive conclusions about cause and effect.
- Cross-cultural studies
  - Compare participants from different cultures and subcultures on one or more aspects of development
  - Identify universal patterns of development
  - Demonstrate that other aspects of development are heavily influenced by the social context in which they occur

Designs for Studying Development

- The cross-sectional design
  - Compares different age groups at a single point in time
  - Is easy to conduct
  - Cannot tell us how individuals develop
  - May confuse age trends for trends that may actually be due to cohort effects rather than true developmental change
- The longitudinal design
  - Detects developmental change by repeatedly examining the same participants as they grow older
  - Identifies developmental continuities and changes and individual differences in development
  - Is subject to such problems as practice effects and selective attrition, which results in nonrepresentative samples
  - May be limited to the particular cohort studied because of the cross-generational problem
- The sequential design
  - Is a combination of the cross-sectional and longitudinal designs
  - Offers researchers the advantages of both approaches
  - Discriminates true developmental trends from troublesome cohort effects
- The microgenetic design
  - Studies children intensively over a brief period of time
  - Studies children when developmental changes normally occur
  - Attempts to specify how and why developmental changes occur

Ethical Considerations in Developmental Research

- Research conducted with children and adolescents raises some challenging ethical issues.
- The benefits to be gained from the research should always exceed the risks to participants.
- But no matter how positive this benefits-to-risks ratio, participants have the right to
  - Expect protection from harm
  - Give informed consent to participate (or to stop participating)
  - Have their data treated with confidentiality
  - Receive explanations for any deception that may have been necessary to collect their data

KEY TERMS

development, 2
developmental continuities, 2
developmental psychology, 2
developmentalist, 2
maturation, 2
learning, 2
normative development, 3
ideographic development, 3
holistic perspective, 5
plasticity, 5
original sin, 7
innate purity, 7
tabula rasa, 7
baby biography, 8
theory, 9
hypothesis, 9
scientific method, 10
reliability, 10
validity, 10
structured interview or structured questionnaire, 11
diary study, 11
clinical method, 12
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benefits-to-risks ratio, 34
confidentiality, 34
protection from harm, 34

ANSWERS TO CONCEPT CHECK

Concept Check 1.1

1. *d.* maturation and learning
2. *d.* all of the above might be considered developmentalists
3. *d.* the optimization of development
4. *b.* Development is marked by plasticity.
5. normative development; ideographic development
6. *c.* perception, language, learning, and thinking
7. *a.* bodily changes and sequencing of motor skills
8. *b.* emotions, personality, and relationships

Concept Check 1.2

1. *b.* Her measure was not valid.
2. *c.* the scientific method
3. *b.* interrater reliability
4. *d.* the clinical method
5. *d.* structured observation
6. *a.* structured interview
7. *e.* psychophysiological methods
8. *c.* naturalistic observation
9. *b.* ethnography

Concept Check 1.3

1. *b.* It is subject to the cross-generational problem.
2. *a.* It does not evaluate individual differences in development.
3. *d.* It may cause developmental changes that would not occur naturally and which may not be long-lasting.
4. selective attrition
5. cohort
6. the researcher
7. *b.* longitudinal design
8. *a.* cross-sectional design
9. *d.* microgenetic design

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